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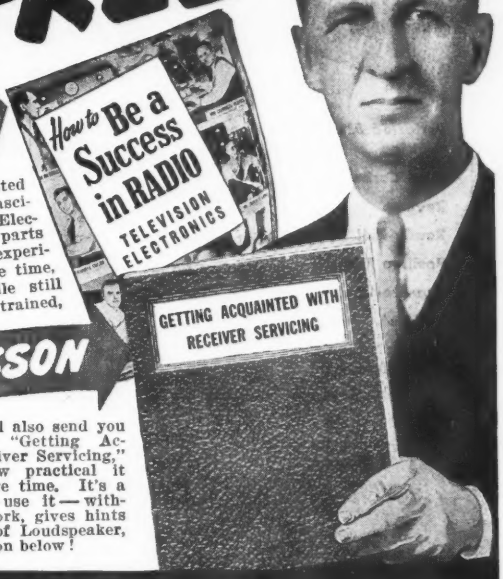

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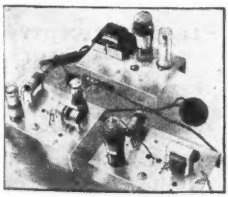

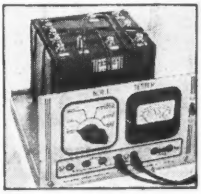

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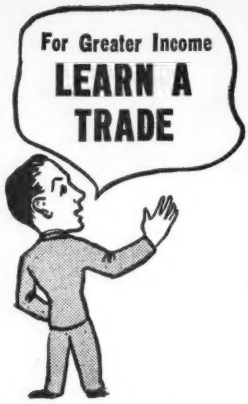

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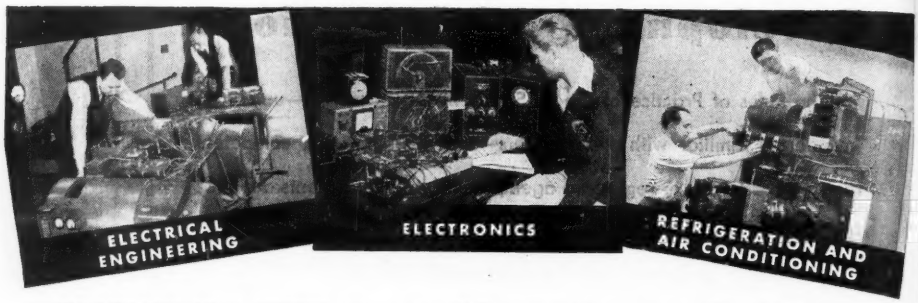

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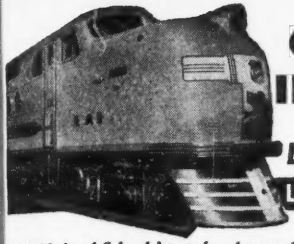

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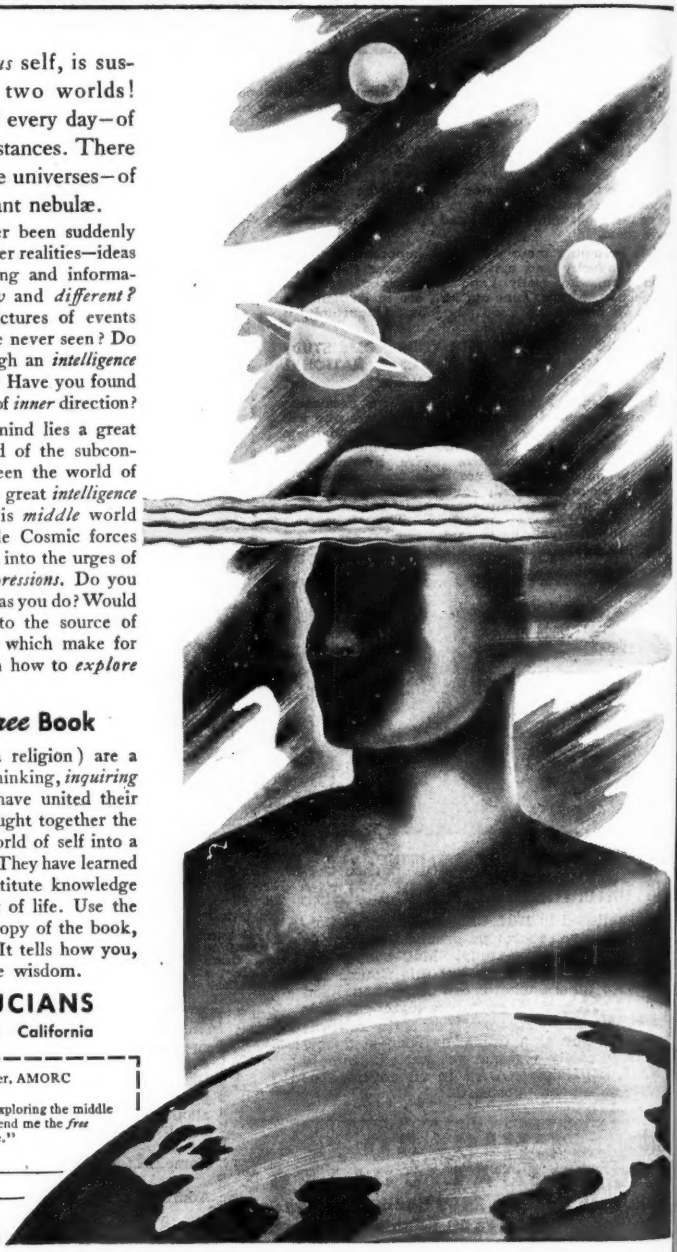

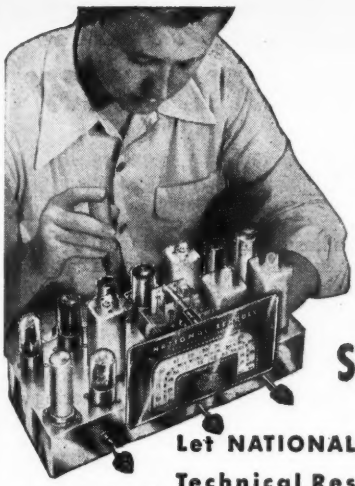

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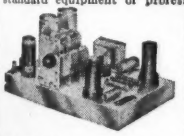

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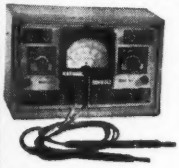

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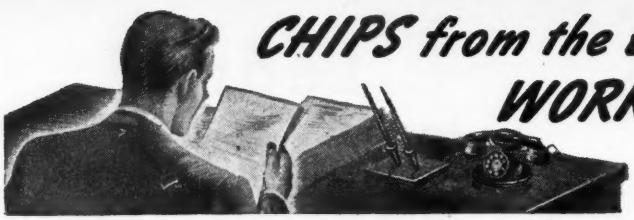

CHIPS from the EDITOR'S WORK BENCH

The Proof of the Pudding

Every now and then a new reader of MI takes pen in hand to write us a letter along the following line:

"Do people really make the things described in the magazine? It seems to me that a great deal of skill is needed for some of them. Is it likely that many readers just like to look at the articles and merely dream about doing the actual work? How many people have the equipment or time to build, let us say, a 26-foot boat?"

The best answer to these questions is found in the photographs of *completed* projects that appear in these columns. We have room each month for only a few of the hundreds of excellent pictures sent to us by readers all over the world.

We have yet to find a project beyond the ability of eager MI readers. In fact, the more complicated the device, the greater is the challenge it offers. Sure, we run a lot of "beginner" stuff too, but this is merely training for bigger and better things. A man with a new set of woodworking tools starts with something easy, like a magazine rack or a foot stool. He has hardly cleaned up the shavings before he is building a corner dish cabinet, or an extension to the porch, or even a whole new set of modernistic bedroom furniture! Another chap may spend an hour on a rubber-band powered model airplane for his son or younger brother, and in a couple of weeks he is inhaling wing dope, puttering with a miniature but powerful Diesel engine and talking aerodynamics.

The camera cranks, the boat builders and the radio hams are in a class by themselves. Just give them new developer formulas, new sail designs and new circuits to play with and they're supremely happy. What if their wives are "cellar widows"? At least the women know where their men are!

Time Heals All

Remember all the dire predictions that were made at the time of the Bikini atom bombs tests? Few of them have materialized. Life on the islands and reefs, and in the lagoon where the wrecked ships lie, goes on practically as if no atom bombs had ever been

[*Continued on page* 22]

A REAL FLYER

Ready for the road and a spin in the Gulf, is this 12-ft. outboard speedster built from MI's "Flyer" plans by Aviation Chief Machinist D. E. Polk of Pensacola, Fla. The boat really lives up to her name, doing better than 25 mph with a 16 hp. motor on the transom. The forward deck is of ¼ in. mahogany plywood, cleverly grooved and painted to simulate planking. The fine craftsmanship displayed in the boat and trailer has earned Mr. Polk a $5 Workbench Award which is already on its way south to him.

ONE MAN AIR FORCE

The five planes shown above were built from MI plans by George McGinnis, 33 Spring Street, Goshen, N. Y., who earns a $5.00 Workbench Award for this picture. He writes: "I like the model plans published in your magazine because the planes themselves are all such good, stable fliers and the selection is so interesting, not just the common run of U-control jobs that look like everything but planes."

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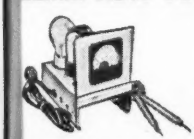

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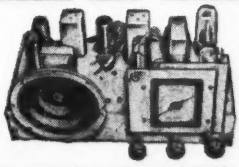
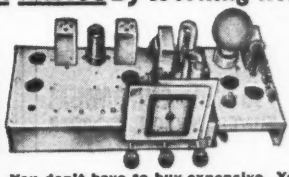
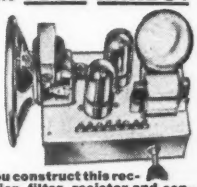


You really learn Radio the PRACTICAL way . . . when you build this big, powerful 6-tube Superhet Radio from parts I send you.



You don't have to buy expensive ready-made equipment. You get valuable experience building this Signal Generator and Multi-purpose Tester.



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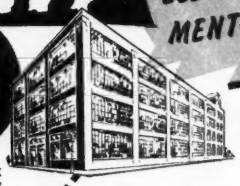

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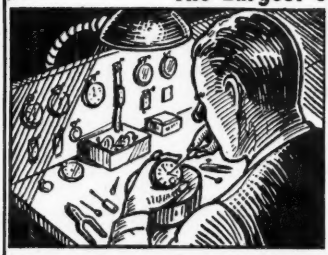

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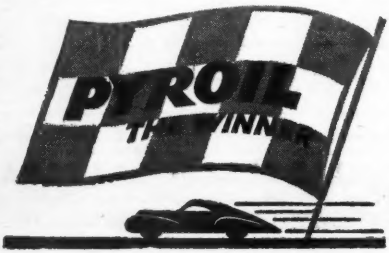

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To facilitate the answering of their mail, readers desiring the advice of Mr. Kraus on inventions matters are requested to observe the following simple rules: 1) Type or write clearly, on one side of the paper. 2) Make sure that your full name and address, including street number and postal zone, if any, are on the letter and all accompanying papers. 3) Mail drawings or photographs flat, not rolled, and include postage if you want them returned. 5) Do not ask questions relating to patent laws. 6) Do NOT send models.

With a background of 25 years of experience in inventions procedure, Mr. Kraus will "call his shots as he sees them" by answering as many letters as possible in this column. His services are free.

Gasoline Turbine

Stanley S. Lusader, Jr., of Perryville, Indiana, sends a diagram of a gasoline turbine and outlines its intended operation. He wants to know if we think the scheme is practical.

ANSWER: *We do not think that you have given enough thought to this subject. You intend the device to operate like a slow speed internal combustion engine and yet expect to get the effectiveness of a high speed turbine. This can't be done in the manner outlined.*

Just look at your own statements. You expect to be able to get a wide range of speed "from low to extremely high," then state that the reciprocating part "travels at a low speed." But both are coupled together through gears in the ratio of three to one! Therefore, if your turbine operates at high speed your piston will also operate at a relatively high speed. A change in the gear ratio, if anything, would have little effect on the end result.

Frankly, we doubt that this device will function properly. It will not serve as a turbine but may work as a return-geared supercharger. Any power which you might get from the turbine would be more imaginary than real, and would be offset by losses by gears and back pressure. There is nothing new to rotating valves. We suggest much more study be given to the entire subject.

Film Developing Tank

A. G. Apodaca of Socorro, New Mexico, submits a diagram of a long style film developing tank which he states provides a cheap, efficient method for processing films.

ANSWER: *There is nothing new to a long style film tank. This writer described the construction of one of these in a magazine article which appeared in 1939. But with your device you need three dark-room operations; loading, washing and fixing. Two of these could be dispensed with by using the same tank; the third also should be. But such tanks are much more expensive to manufacture because they require more metal or plastic.*

Contrary to your implication, the amateur photographic field is a lucrative one. Give the amateur a film tank which he can load as simply as he can thread a roll of film in the camera, and you will have a marketable product. Yes, we know that such devices have been made, but they could be improved; in fact, made entirely automatic. Do it inexpensively and you have something really valuable.

Lipstick Holder

William A. Tedesco of Dunmore, Pennsylvania, asks about a lipstick case for which he enumerates outstanding qualities.

ANSWER: *It is absolutely impossible for us to comment on a device upon which we have as little information as you have given. Lipstick holders which may be operated with one hand have appeared on the market. Some of them still are available. Most of them have provisions for replacing with another filler of the same or other shade.*

But these are the very things which you claim as advantages of your product. You may or may not have something worthwhile. Suggest that you request your attorney to have the records searched.

Toy Tommy Gun

J. Thornton Baston of Glendale, California, sends a diagram of a toy machine gun which will run off a roll of perforated caps. His questions are made clear by the reply.

ANSWER: *We are not too favorably impressed with your design of a Tommy gun toy which shoots caps supplied from a perforated roll. The mechanism is too complicated and expensive to produce if you expect to sell the article at the normal price for such toys.*

There is no excuse for a plurality of striking mechanisms when a single hammer would work as well or better. Projections on the rotating drum could serve to release the hammer or raise it to striking position. By such re-design you could eliminate one drum and seven firing units, insure greater ease of ad-

[Continued on page 24]

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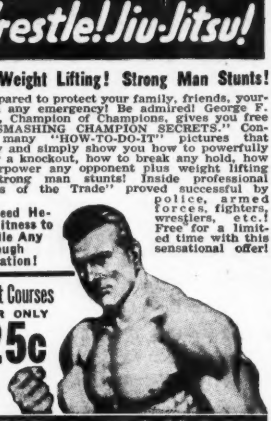

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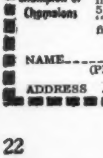

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Editor's Workbench Chips

[*Continued from page* 14]

built. Slight amounts of radio-activity are detectable occasionally in fishes and other aquatic organisms, but there seems to be no large-scale difference in either the animal life on the reefs or the swimming life in the water. No monsters have been born or hatched and animal reproduction goes on as usual. No land plants show any trace of their atomic experience. This reassuring news is brought back by a group of scientists who visited the twice-blasted atoll last summer.

Needed Inventions

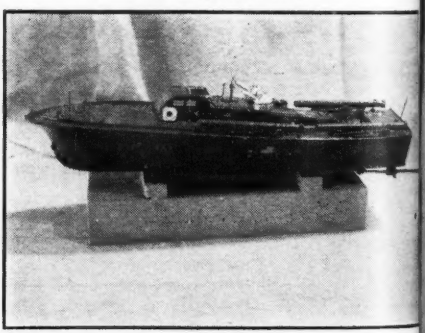
Want to put your inventive genius to work? The Army, the Navy and the Coast Guard would be delighted to have you solve a few problems for them. High on their list of

[*Continued on page* 169]

MI'S BOUNCIE

Richard P. McKee of Madison, Wisc., is one fourteen year-old who doesn't loaf after school, as this nicely detailed model of MI's speedboat Bouncie proves. The job took Dick about 6 months and included a lot of redesigning, mostly on the sedan top which he added to the original plans. Keep up the good work, Dick, and to add a bit of encouragement, we're sending along a $5 Workbench Award.

MODEL PT BOAT



This 3/16 in. scale model of one of the Navy's famous PT's is the work of Bernie A. Niffenigger, South Haven, Mich. The model is complete with torpedoes, controls on the bridge and movable gun turrets. Nice modelling, Bernie, and there's a $5 Workbench Award in the mails with your name on it.

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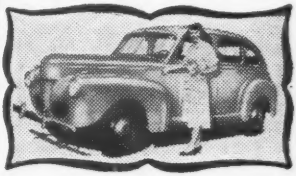

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[*Continued from page 20*]

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Until there is a change in present city and state laws, interest by manufacturers in items of this sort will become less and less. In many locations it is illegal to sell even a single-shot cap pistol. It is illegal to sell or store caps.

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[*Continued on page 171*]

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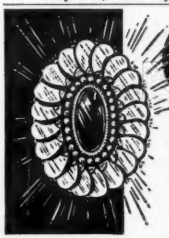

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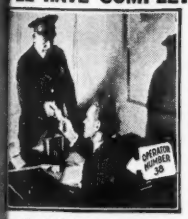

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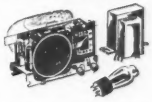

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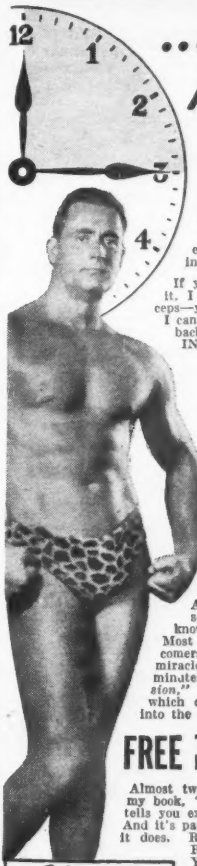

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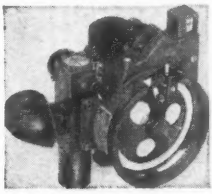

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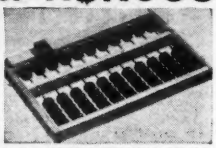

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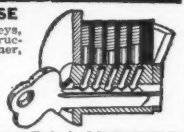

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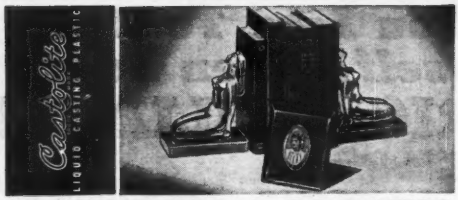

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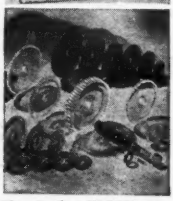

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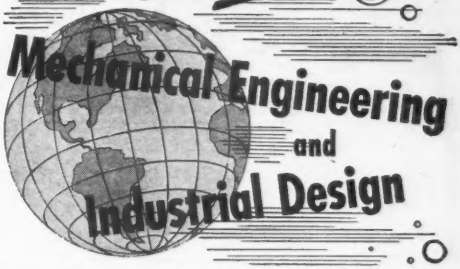

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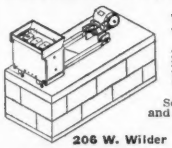

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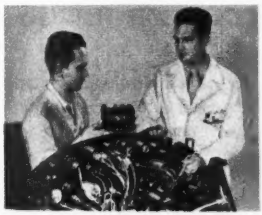

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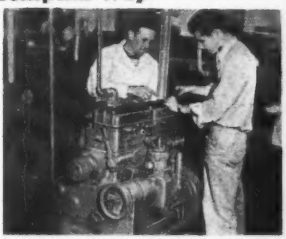

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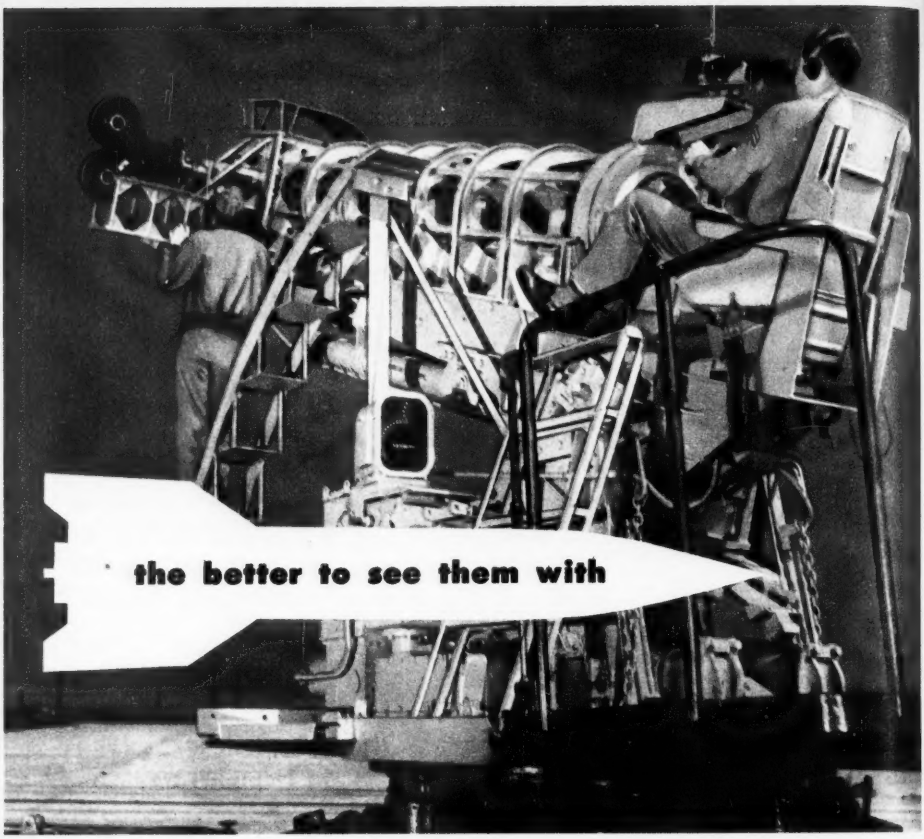

This colossal 16-inch reflecting telescope was designed and built by the U. S. Army's Ordnance Department. Artillerymen and airmen will use it to study the flight of guided missiles whizzing along at 3000 miles an hour at altitudes of 100 miles or more.

The telescope, fixed to an antiaircraft gun mount, tracks three and four degrees per second in azimuth and elevation, respectively. A 35-mm. camera attachment records the image produced by the telescope, takes 15 exposures every second. Experts are thus able to check missile controls, collect aerodynamic information, and follow ejection of instruments attached to the missiles.

The reflecting telescope is another spectacular example of what the U. S. Army is accomplishing in the fascinating realm of research and development. Thousands of projects, covering virtually every scientific field, are going forward daily at Army laboratories and proving grounds. If you want to be a member of an organization that is leading the way to great new things for the future, consider the U. S. Army. There are many new programs available specifically to young men interested in science. Your nearest U. S. Army and U. S. Air Force Recruiting Station will be glad to give you full details.

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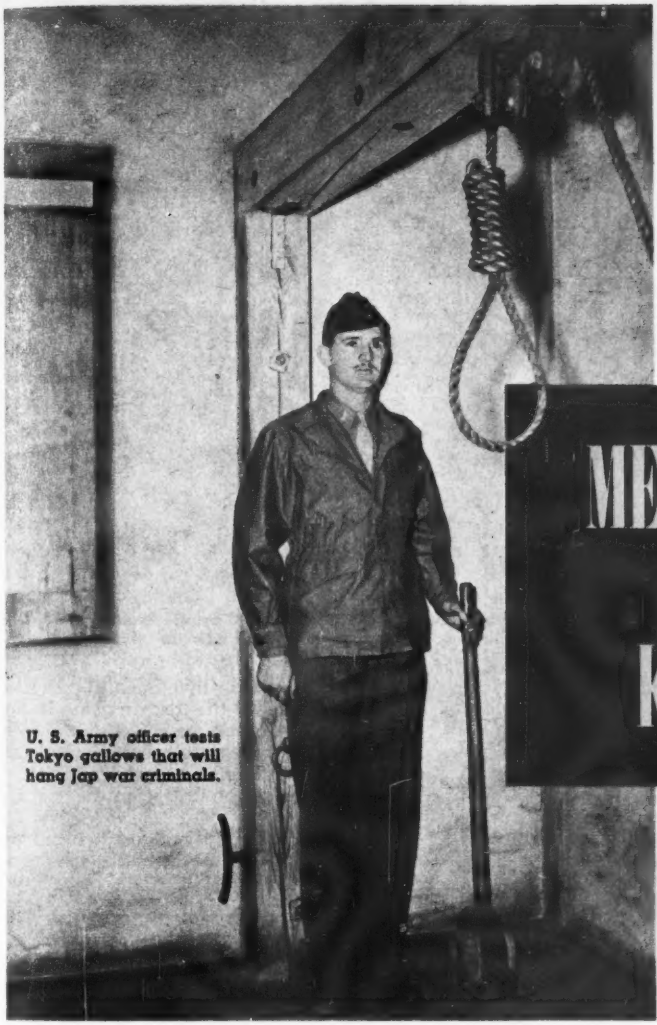


U. S. Army officer tests Tokyo gallows that will hang Jap war criminals.

MECHANICS of KILLING

BY
LESTER DAVID

From the first torture rack to the latest gas chamber, science has transformed the criminal's execution from a human butchery into a skilled profession.

WHEN the world was younger, the law's method of exacting an eye for an eye and a life for a life was crude. Today the mechanics of executions have been made both deadly and scientific.

Not so always! In ancient Rome a condemned man, clad only in a loin cloth, was shoved by his executioner into a large sack. Into the sack also was placed a dog, a rooster and a poisonous snake. The writhing bundle was hurled into a swamp, and the execution had been carried out.

In England, in the Middle Ages, a victim was chained to the stone floor of his cell, and he was forced to lie prone with heavy weights clamped to his back. Each day the jailer brought a slice of moldy bread, a cup of stagnant water, and added another

Smiling Filipinos try out the garrote, mode of execution favored by the Spanish in their occupation of the Philippines. A turn of the screw kills the victim.

weight. The bread and water got smaller in quantity each day. The weights grew heavier. Finally, the wretch died.

For centuries the unfortunates who incurred the death penalty were broken on the wheel, boiled in pitch, drawn and quartered, impaled on pickets, hurled onto sharp rocks from steep cliffs, burned at the stake, torn to pieces by red-hot pincers or buried alive. Scientific execution has replaced the torture death in the modern democratic state. Today the men who carry out the state's sentence of death are skilled craftsmen, whose goal is swift, merciful execution by scientific instruments.

Take the science of hanging, which now requires intricate mathematics and hair-

HANGMAN'S TABLE

DROP (ft.)	WEIGHT (LBS.) 112	126	140	154	168	182	196	210	224	238
1	8	9	10	11	12	13	14	15	16	17
2	11	12	14	15	16	18	19	21	22	24
3	13	15	17	19	20	22	24	26	27	29
4	16	18	20	22	24	26	28	30	32	34
5	17	19	22	24	26	28	30	33	35	37
6	19	22	24	26	29	31	34	36	39	41
7	21	23	26	29	31	34	37	39	42	45
8	22	25	28	31	34	35	39	42	45	48
9	24	27	30	33	36	39	42	45	48	51
10	25	28	31	34	37	41	44	47	50	53
	FORCE (100 lbs.)									

British Hangman Barry worked out this table after finding a 2400-lb. jerking force broke a criminal's neck without strangling him or pulling his head off. Find the figure closest to 24 in the column under the victim's weight. Number on the same line in the drop column is the distance in feet he must fall to snap his neck.

split planning for a technically flawless job. A sudden snap must break the neck cleanly; there must be no mutilation or slow strangulation, proof that the execution has been bungled.

In the 17th and early 18th centuries hanging was a crude affair. Someone tossed a rope over the gallows. One end of the rope was hastily knotted in a noose which was slipped around the victim's neck. Then the man holding the other end of the rope jerked the victim into the air.

Even this was an improvement over a still earlier hanging method. In this case, the condemned man was forced to stand up in a horse cart while the noose was yanked down over his neck. Suddenly the horses were whipped. The man fell off and choked to death as the cart-pulled rope dragged him over the ground.

Not only has the modern state perfected the actual act of hanging, but it has done much to bolster the victim's morale before execution. Many states have done away with the old-fashioned gibbet which stood menacingly in the prison courtyard. Formerly the prisoner had to walk a long "last mile" and march up the wooden steps to the gallows. Now the victim simply walks a few feet from his cell onto a hidden trapdoor.

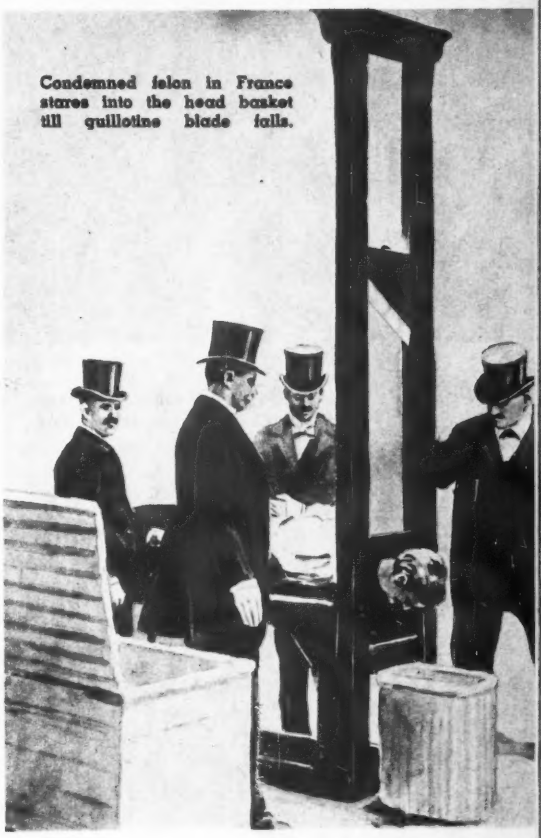
The mechanics of hanging calls for close attention to the rope, the noose and the exact distance of the fatal drop through the trap.

If the condemned man twirls or spins at the end of the rope, or if he gurgles, gasps, draws up his knees or convulses in spasms, the hangman has muffed his job, for these indicate that the man is dying of slow strangulation. In this case, he may stay conscious for as long as 20 minutes.

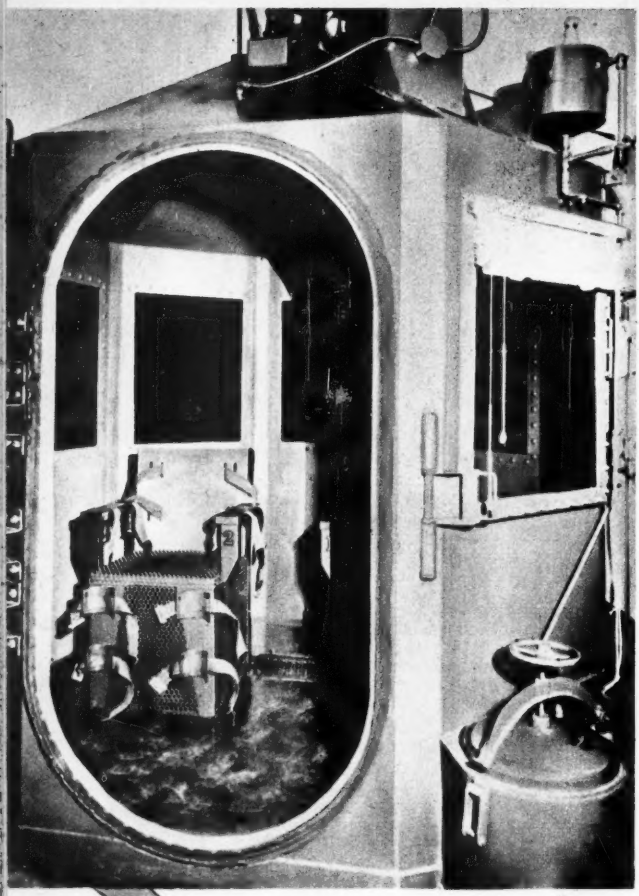
On the other hand, if there is no sound or motion and only a gentle swing on the end of the rope, the criminal has died quickly of a broken neck. And this time the hangman knew his craft.

The rope itself is probably the most important single tool of the hangman's trade. Hemp is almost universally used. It gives a sharp snap when jerked taut, and it's this snap which breaks the neck and severs the spinal cord. The hangman must soap-stone his rope and keep it in a cool, dry place to retain its freshness. Most executioners use a 13-foot piece of five-strand, ¾-in. Italian hemp with ten twists. A fiber rope does

The Chinese "caged" a criminal to death by taking out stones under his feet one by one till he choked.



Condemned felon in France stares into the head basket till guillotine blade falls.



Murderers at San Quentin Prison meet death in this gas chamber.

not stretch and therefore is never used. Each execution requires a new hemp rope, because the snap lessens markedly after the first hanging. Thus, in the official photographs of the Nuernberg hangings each dead Nazi is shown lying with his own rope around his neck.

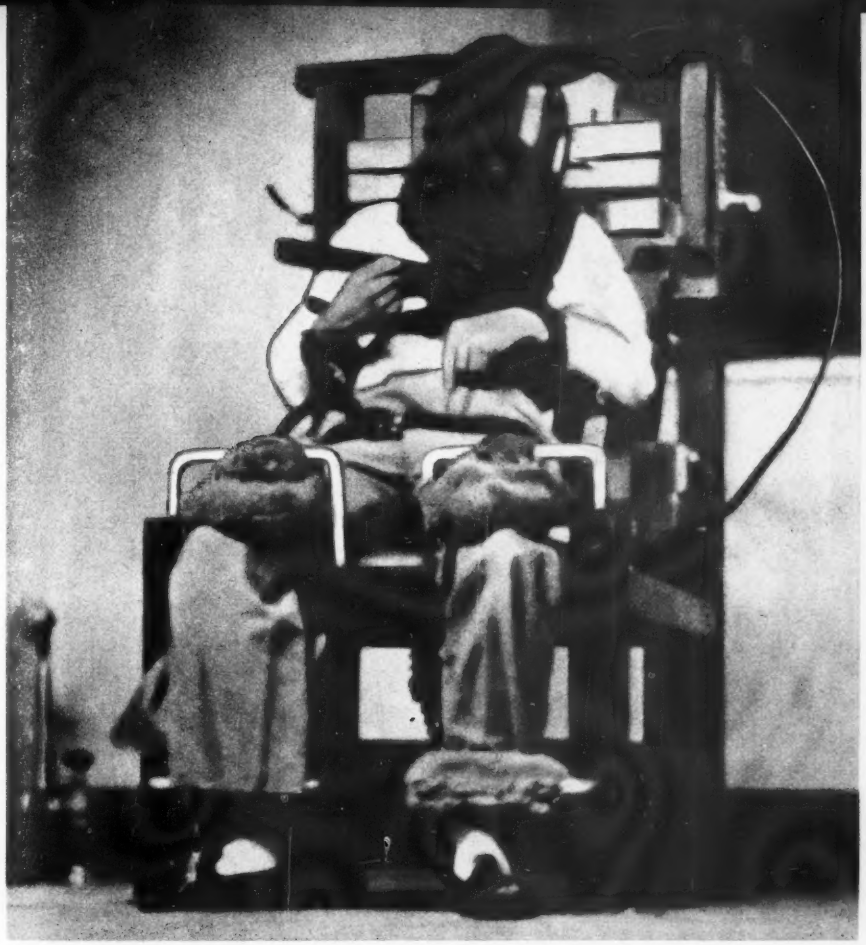
The most vital task of the hangman is to calculate the correct "drop." If the victim falls too far, the rope will cut the neck or even sever it. If he doesn't drop far enough, the rope merely binds tight about his neck and slowly chokes him to death. (See Table page 52.)

In figuring the drop, many factors must be considered—the weight of the victim, the size of his neck, the strength of the muscles and the bones. The hangman makes a minute study of the condemned the day before execution and consults the prison doctor's records. The hangman may even enter the criminal's cell to examine him personally.

In Spain the garrote is still the traditional way to execute criminals. It has been greatly improved since its first use in the Middle Ages, however. Formerly, the executioner twisted a cord or bandage around the victim's neck by means of a garrote or "cudgel" until he strangled. Later, the mechanical collar and other innovations to quicken death were adopted.

Swordsman's aide pulls pigtail to hold Chinese victim's head.

The victim now sits upon a post or stool and leans against a heavy stake. Attached to the stake is an iron collar, which the executioner clamps around the victim's neck. The executioner tightens the collar by turning the heavily weighted levers fastened to a big screw. The collar itself has an upper and a lower ring, and as the screw turns, the upper ring is drawn toward the stake while the lower is pushed away, creating a "scissors" action. If the executioner adjusts the double collar on the victim so that one of the rings presses on one vertebra and the other on an adjoining one, the executioner can turn the screw rapidly and thus dislocate the spinal column. The dislocation kills the criminal immediately.



Gerald Thompson digs his nails into his palms as his body stiffens in the Joliet, Ill., electric chair under the jarring crash of the first 2,500-volt shock. He died for killing Mildred Hallmark, Peoria beauty.

In another widely used version of the garrote, there is a sharp blade in the rear of the collar. When the executioner turns the screw to tighten the collar, the blade slices into the neck and causes instant death.

Execution by beheading, however, reached its peak, scientifically as well as numerically, with the guillotine during the French Revolution. For swift and sure beheading, the guillotine has never been surpassed.

Although it is commonly believed that the guillotine was born during the revolution in France, the Scots had a similar device almost two centuries before. As in the guillotine, a blade moved in grooves set in an upright frame. Dubbed "The Maiden," the Scottish device was used for nearly a century before being discarded. The French machine, suggested by Dr. J. I. Guillotine for the speedy execution of anti-revolutionists, improved upon the crude "Maiden." This improved model still is used in France today.

The guillotine consists simply of two upright posts, topped by a crossbeam grooved to guide an obliquely bladed knife. The back of this big knife is heavily weighted, and the blade "chops" down swiftly when the executioner releases the pull rope.

Without a guillotine, beheading is one of the most difficult executions to perform. There are many cases on record where the headsman had to make up to a dozen strokes before he finally succeeded in beheading his victim.

In England, before beheading was cast aside, the exe- [*Continued on page* 89]

'Copter farming machine wheels low to crop-dust blueberries in Maine.

Flying Farm Machine

BY ARCH WHITEHOUSE

FALL came early in Western New York last year. Frost threatened to destroy the large crop of tomatoes still ripening on the vine.

The Huxley Canning Company, worried about losing its special 70-acre crop, called on the Helicopter Service of Syracuse for emergency aid. At 2 A.M., Oct. 1, a helicopter pinwheeled over the field. For four hours it hovered back and forth over the frost-cold tomatoes.

The ground temperature was a killing 26 degrees when the helicopter first swooped low over the tomato plants. The down-draft from its whirling blades, however, spread a warm blanket of air over the ground and raised the temperature above freezing again. As a result, the company's whole tomato crop was saved, while frost damage was heavy on all neighboring farms.

Until recently, heavy ground machinery was used for spraying potatoes and cranberries. Then in 1947 the National Cranberry Association of Massachusetts put a new farm machine in the sky over their cranberry bogs—a Bell helicopter specially built for crop-dusting. Two of these machines covered an average of six acres every ten minutes and killed off 100 per cent of the gypsy moths and other cranberry destroying insects in the bogs.

A crew of men with surface dusting equipment would average less than ten

acres a day. Their heavy machinery would crush and destroy at least ten per cent of the potential crop. The typical cranberry bog yields 45 barrels per acre, and since a barrel sells for about $15, this extra ten per cent in itself means a saving of approximately $67.50 per acre. Also, precise timing in dusting cranberry bogs means a better crop. Men using their heavy surface equipment take a full day to dust just one end of a cranberry bog; the helicopter can cover the whole bog in a few hours.

Aroostook County in Maine supplies about 12 per cent of the nation's crop of potatoes. The Air Agricultural Service of Underhill, Vermont, demonstrated helicopter crop-dusting in wide areas of Maine last year. In August, one helicopter dusted 6,144 acres of potatoes in 159 hours and 45 minutes of flying time during the 26 days of demonstration. Actually only 53 of these hours were spent over the potato crop, the charge to the crop owner averaging $2.53 per acre. The helicopter service now is adding three more ships and plans eventually to expand its "egg-beater" squadron to at least 30 to meet the demands in New England for this efficient potato-dusting machine.

Recently, in Argentina, ten Bell helicopters were used to break up a dangerous locust plague. The locusts had eaten a $25,000,000 hole in the Argentine corn crop in a single season. Working in two-ship teams the helicopter squadron fought the locusts with 6,000 pounds of commercial of dinitro-ortho-cresol. The locust swarm was so thick that the pests made up close formations 20 miles long, five miles wide and several hundred feet thick, but within six hours the helicopters were credited with a 98 per cent kill. The attacks were made by hovering above the swarms as they were stripping all vegetation from the ground, or sometimes by mushing the helicopter directly into fluttering clouds of the locusts.

In 30 minutes last summer, blades of a single helicopter fanned the moisture off 20 acres of rain-soaked California cherries and thus saved the ripe crop from spoiling in the warm sun. The rotors thrust about 1,800,000 cubic feet of air downward every minute at an average speed of 20 mph. This powerful downdraft also can be used to dry unseasonable rain from other fruits, vegetables and grains and protect them from critical damage just as it did the ripe cherries.

Crop-dusting by airplane is not new. For years, fixed-wing aircraft have been

Farm workers load helicopter right in the field with 400 lbs. of dust for crop pests.

No corner of the farmer's field is too close or too heavily bordered with trees for 'copter dusting.

engaged in crop protection work, particularly in the cotton fields of the South. Speed and flight limitations, however, limit the agricultural ability of the orthodox aircraft.

First, the fixed-wing aircraft must fly at a relatively high speed to avoid stalling and thus is not as maneuverable in confined areas as rotary-wing aircraft. Then the conventional plane needs a special airfield for takeoff and landing. That landing field may be miles away from the area to be dusted. But the helicopter can land in any area only slightly larger than the square area of its rotor blades. Therefore it can work directly from the barnyard of the farm where the crops are to be dusted or sprayed. Or, better still, it can land and take off next to concentrated piles of dusting supplies brought right to the field.

Often, the greatest pest damage to crops is found near the outer perimeter of a planted area. If this affected border runs up to a high hedge or a line of sheltering trees, the fixed-wing aircraft cannot safely cover the very part of the crop where dusting is most needed. The helicopter experiences no such trouble since it can be flown at low speed and at varying angles so that the insecticide can be spread carefully even in restricted areas.

In addition, because of the down-blast of its rotors, the insecticide blown down and fanned out over a much wider area, and the discharge of dust or spray can be more efficiently directed and controlled. The fixed-wing plane can only fly over a broad crop area and discharge its dust or chemical spray well above the crop to be protected. The dust or spray then falls and usually covers only the upper leaves or branches of the crop. The helicopter, on the other hand, not only discharges a wide dust band, but the chemicals are driven down under the lower leaves or branches of the crop and swirled up again to cover all the under-surfaces.

The helicopter also can be outfitted for seeding operations of all kinds. Seeding rice, grass and even the re-seeding of forest areas have been carried out. To guard against heavy losses from hungry squirrels and birds, the seeds are encased in an organic, readily decomposable pellet.

The various crop seasons all over the United States offer a wide outlet for helicopter crop-dusting, spraying, seeding, frost prevention and moisture control. Besides aiding the farmer on crops, the flying farm machine also has rounded up and dusted cattle and helped to locate strays and inspect fences.

For months now the Bell helicopter, the first rotary-wing aircraft licensed for crop-dusting, has been doing farm work under the close supervision of Federal and State agri- [*Continued on page* 168]

Powered Wheelbarrow

BELL Aircraft Corporation of Buffalo has pulled its head out of the clouds and is down to earth with a machine to lighten the working-man's burden—a powered wheelbarrow. They call it the "Prime Mover."

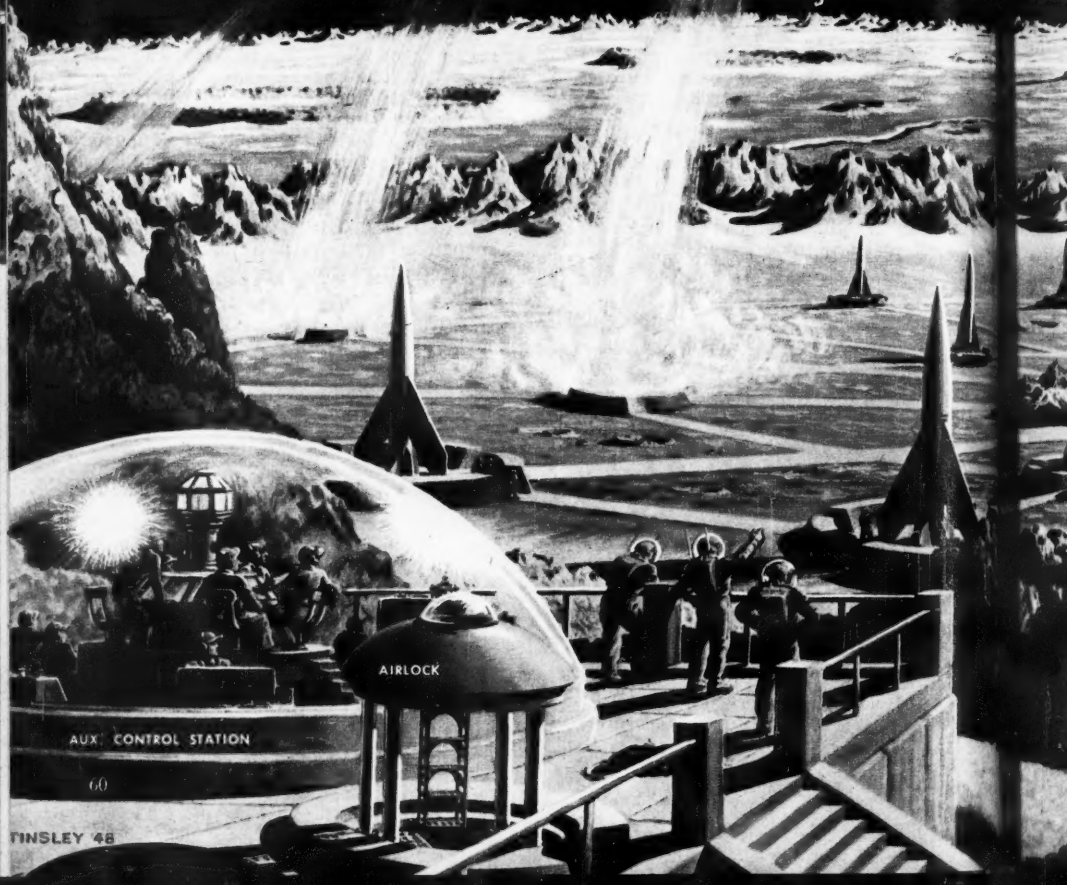
The machine is touted as a pint-sized tractor or bulldozer. It is capable of handling 1,000 pounds of wet or dry material on a 20-per-cent grade and can be equipped with a bucket, a wooden or steel platform, or a snow plow.

It is fitted with three wheels and is powered with a three-horse-power, air-cooled engine. Weight is 400 pounds. It is about three feet high and wide, and five feet long. The bucket, with a capacity of 10 cu. ft., is quickly interchangeable with a platform. Dumping mechanism is automatic, as shown in the picture at lower right. Its operating pace is comparable to a fast walk.

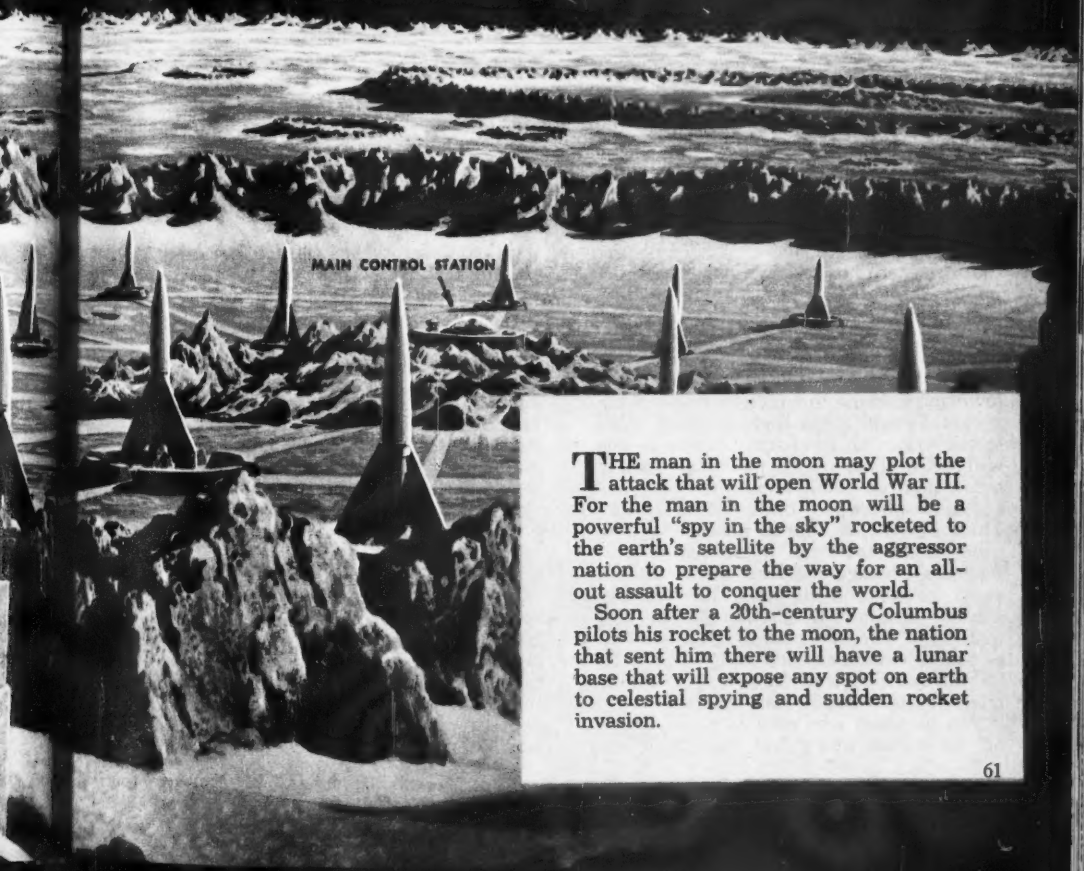
Anybody can learn to operate it in a few minutes. The girl at lower left is maneuvering a load of plaster onto a weighing platform. •

Invasion Base on the Moon

"The first nation to establish a lunar military outpost will rule the earth," says Willy Ley, expert in rocket research.

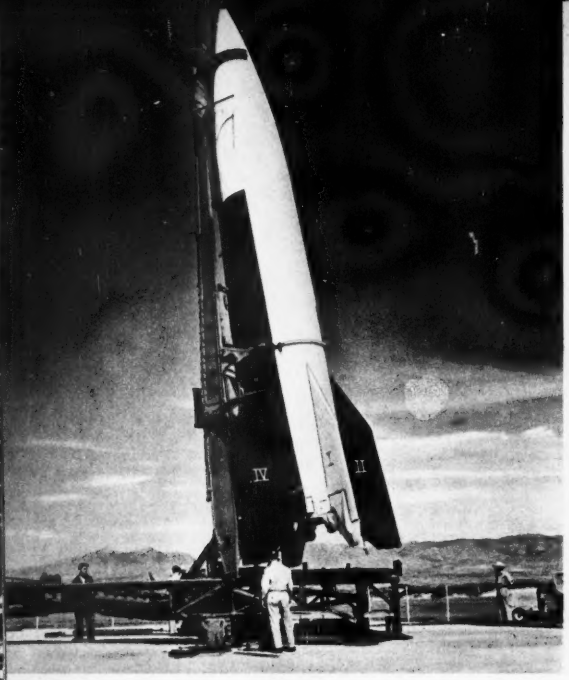


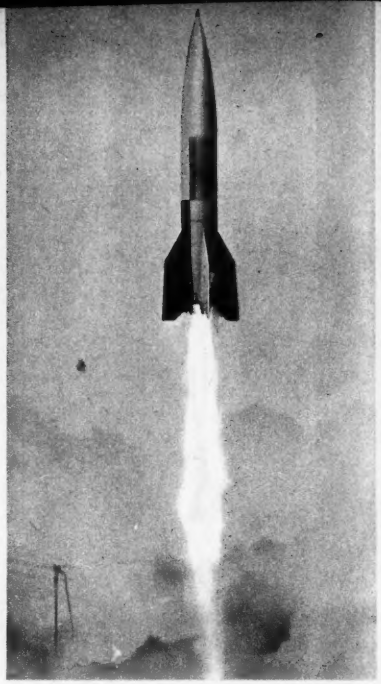
The moon base could be built in a large crater, a mile or so wide, containing concentric rings of launching platforms. A spoke-like network of roads would join these to the main control dome in the center. An alternate control post, at left, could be hidden in the crater's rim. Rockets shown are similar to Nazi A 9.



THE man in the moon may plot the attack that will open World War III. For the man in the moon will be a powerful "spy in the sky" rocketed to the earth's satellite by the aggressor nation to prepare the way for an all-out assault to conquer the world.

Soon after a 20th-century Columbus pilots his rocket to the moon, the nation that sent him there will have a lunar base that will expose any spot on earth to celestial spying and sudden rocket invasion.





The 46-ft., 14-ton German V-2, shown above on its launching platform and in flight, penetrated the stratosphere far above the earth's surface. In a few years, the author states, a pioneer will reach the moon.

The moon's terrain, scarred with countless craters, has thousands of excellent sites for offensive bases. The aggressor who sets up the first interplanetary outpost on the moon can dominate not only the world but the entire solar system.

As the moon-bound rocket zooms out of the world, the space explorer will see that the earth has become a great display window for him. In a single historic flight he will have eliminated from the vocabulary of the world's nations the term "military security."

From the barren lunar wasteland or towering volcano to which he anchors his rocket he will focus high-powered telescopic lenses on the earth. These lenses will be 5 times more powerful on the moon than on earth, since the moon has no atmosphere to limit magnification. Thus, he will be able to observe, at one time, great factories operating in Los Angeles, Chicago and New York. As the earth rotates on its axis, he will see similar activity in London, in Moscow and in Tokyo. The new man in the moon will be able to watch as each nation works on its railroads, ports or factories—or stockpiles of atom bombs for war.

The pioneers who plan to build a base on the moon won't find their task too tough, even on the basis of what we know today about conditions there.

Like the earth, the moon has a day and night. One complete night-and-day cycle on the moon, however, lasts a month. Fourteen earth days of cold night anywhere on the moon follow a similar period of intense heat when that same part of the moon's surface is exposed to the sun. During a "moon day," the great satellite's surface is heated to a temperature of 392 degrees. "Moon nights" will approach absolute zero in coldness.

As a result of these extremes of temperature, the moon pioneers will find its surface covered with rock debris, chips and dust, since no rock can stand such sudden heat changes without cracking. And since there is no air on the moon, the moon men will find no surface water.

The base builders, then, will face a double problem of maintaining an even temperature and providing themselves with air and water.

By going underground they will solve the temperature problem, since the extremes of temperature occasioned by the month-long lunar cycle are strictly surface phenomena. The first expedition to the moon will look for a large, deep cave, because the temperature below the surface debris, [*Continued on page* 162]

A well-known aircraft company, which desires to remain anonymous, is working on this man-carrying rocket depicted by an MI artist. Wings control it in air.

The Golden Hamster

These little rodents breed four times as fast as guinea pigs, can contract more human diseases than any other animal. No wonder scientists are excited—

BY WILFRED WEISS

A DOCTOR in Fort Worth, Texas, is having a feud with his nurse over a pair of Golden Hamsters he bought for laboratory experiments. She argues that the friendly little beasts are too cute, and won't give them up for any lab work. But the doctor is fascinated by the unique laboratory value of the creatures and insists that they be sacrificed for science.

The Hamster is an appealing little animal with a pink nose and black eyes that bulge out like Eddie Cantor's. Its fine silky pelt is unusually loose and pliant and ranges in color from golden tan in the summer to mahogany red in the winter. When fully grown, the Hamster is about 5 or 6 inches long and weighs up to 4 ounces.

Hamsters are so sensitive to human diseases that when you have a cold you don't dare handle them because they'll become infected immediately. In fact, they are even sensitive to the human breath and will draw back if you exhale near them. On the other hand, there is no disease peculiar to Hamsters, and there is no known case of anyone catching a disease from them.

Not only are they susceptible to human ills, but they contract these diseases faster, and in severer doses. Army doctors learned this during the war. By infecting Hamsters with bacteria our armed forces might be expected to encounter in various parts of the world, the doctors were able to study the results and devise preventive methods and cures that saved thousands of lives.

A spectacular peacetime medical use of the Hamster is in laboratory exploration of that dread but little known disease, leprosy. Another use is a new test for pregnancy. By using 3 female Hamsters, a doctor can conduct a simple test in his office and determine pregnancy within 2 hours. He can also use them to test for tuberculosis and get results in 10 to 12 days. The dentist as well as the doctor finds the Hamster valuable in laboratory research. The effect of a diet deficiency, for instance, will show up in Hamsters' teeth in a few days.

Despite this animal's great aid to science, man still knows very little about its origin or background. The first pair apparently were brought to the United States in 1938, probably smuggled through Palestine from Syria, thought to be their native habitat. Some breeders say that all of them now in this country have descended from that original pair, but returning GIs may have brought in others since then. In any case, the first known record of Golden Hamsters dates from 1930, when a Hebrew zoologist dug up a litter near the Syrian city of Aleppo.

One of the earliest breeders of Hamsters in this country is E. B. Gunter of Fort Worth, a former saxophonist in name bands, who maintains that herein lies our best hope of cracking the mystery of cancer.

Ever since Gunter got his original pair from pioneer stock, he has been running a one-man campaign to tell doctors and scientists about their remarkable value in medical research. He discovered, for example, that none of the few doctors who had worked out a speedy way to test pregnancy with the animal had bothered to publish the information. He kept after the doctors until one gave up and supplied the data. Now part of his crusade is to pass on this information to every other doctor and laboratory technician.

As Gunter has found, the Hamster will eat and thrive on anything but fats, citrus fruits, onions and garlic.

While it eats only once a day, it will never refuse food, however. If you offer it food after it has had its daily meal, it will still gobble everything in sight, storing it in pouches that open into its mouth and extend halfway back along both shoulders. Then in its nest it empties these pouches by placing its fore feet behind its shoulders and pushing out the food, still as dry as when it went in, through its mouth.

Unable to defend itself against other animals, in its natural state the Hamster burrows into the ground and steals out only at night to hunt food. In captivity it still prefers to sleep during the day. At nightfall when allowed out of its pen, it crawls with a slinking motion, its stomach dragging the ground like an underslung dachshund.

After making the little animal the prey of practically everything else on earth, nature balanced its timidity with a friendliness rarely matched by other creatures. If you sit still, the Hamster will crawl up

Unusually docile, friendly and even cute, Hamsters make ideal pets. They can be taught simple tricks such as crawling up your arm or burrowing in your pocket. Here breeder Gunter poses one on his hand.

your arm and down into your lap. Then, if it decides it is among friends, it will snuggle into your pocket. Adult Hamsters have a strong grip in their toes and have an amusing trick of clinging by one fore or hind foot to your fingers.

Hamsters are easy to breed and raise. Gunter, who has a full-time job as office manager in a box-manufacturing plant, finds a half hour each day is sufficient for the 10 or 12 females and the 2 males he keeps on hand.

They are very neat housekeepers and adapt themselves easily to varying climatic conditions. Because they also have no odor, pets kept in the house are never offensive. The pens should be cleaned once a week and disinfected once a month. Other than that, the main consideration in breeding is to avoid noise. Evidently they haven't become used to the change from the desert silence, and a sudden noise throws them into a frenzy of fear. A frightened mother of a new litter will grab the babies in her mouth and hide them in her pouch. If she is not reassured immediately, the baby Hamsters will suffocate.

For the beginner in Hamster raising, Gunter recommends controlled breeding with a single male and a single female, two to four months old, in the same pen. This is better than the open breeding of several males to a group of females in the same cage. It lets you observe the animal's habits and gives you a chance to keep more exact breeding records.

When the female decides to breed with a male, she will stand rigidly still. If she doesn't do so 5 minutes after she has been placed in the male's pen, you will know that she is not going to accept the male,

and the trial should be repeated once a day until the female accepts. Then they should be left together as long as they show interest in each other, usually about 15 minutes.

Hamsters reproduce in 16 days, as compared with 60 days for guinea pigs, and 30 days for rabbits, which are the 2 most commonly used laboratory animals today. With the average litter running 5 to 11, and the average female capable of bearing 6 litters in a life span of 2½ years, quantity is no problem. According to Gunter's estimate, they cost only about 50 cents a litter to raise.

The exact cost of a trio of breeding Hamsters, Gunter says, is still something to be established. Hamster raising is so new that their market value changes rapidly.

For novice breeders he recommends 2 virgin females and a male, from 8 to 10 weeks old, weighing 2½ to 3 ounces each. The price of such a healthy, breeding trio will run about $12 to $15.

The market for Hamsters is already broad but still developing. Gunter has found that word of their pet-appeal quickly spreads around the community. The size of your pet market naturally will depend upon where you live and how much word-of-mouth and other advertising you do. The average price for Hamsters as pets—usually the males—is about $2 to $3.

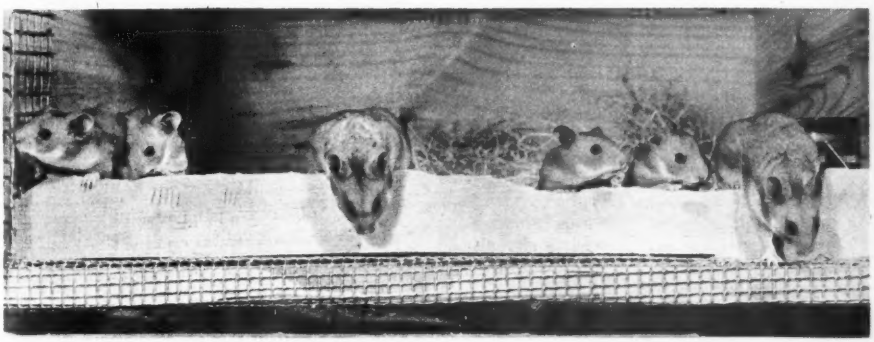
One of the best ways to investigate a commercial market for Hamsters is to query your family physician about laboratories in your community. You can also get in touch directly with research laboratories, colleges, agriculture schools, and high-school biology teachers. Again there is no established price, but Gunter has found that it ranges from $12 to $25 a dozen for 7- to 12-week-old stock.

The female Hamster doesn't like to be handled at mating time, so Gunter scoops her up in an empty soup can whenever he desires to move her.

Another market for Hamsters lies in brokers or dealers, who buy from breeders and resell to laboratories. This spring they are paying about 50 to 75 cents per animal. You furnish the shipping crate and pay the freight. Gunter advises that it costs no more to ship 50 young Hamsters than it does 10. To make a reasonable profit it is wise to be prepared to ship a larger number of similar age.

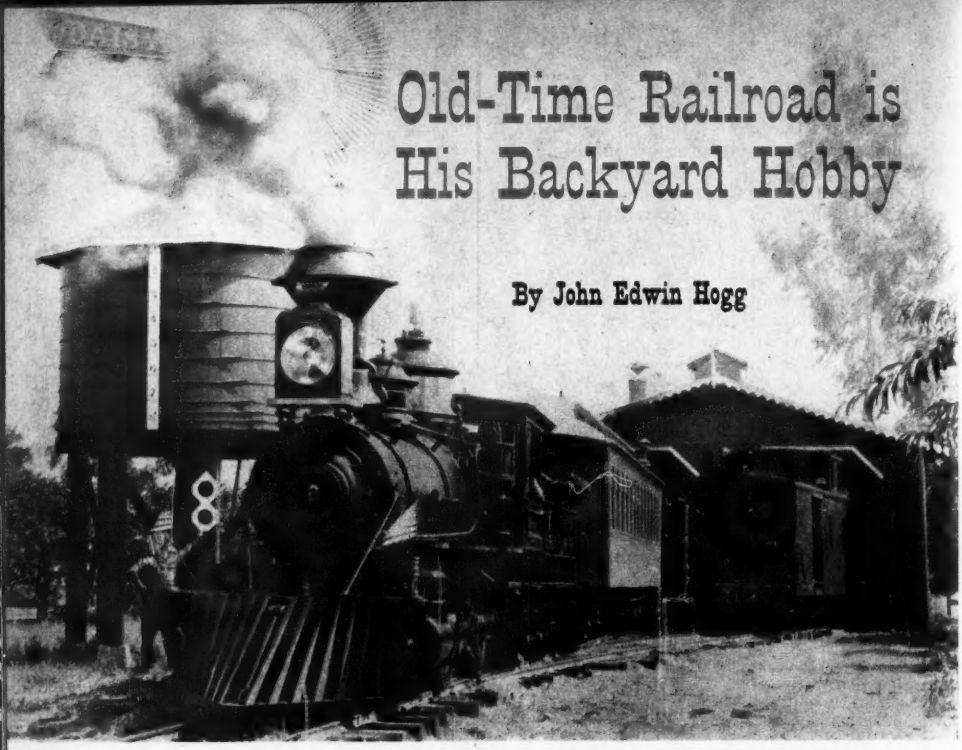
In spite of their rapid breeding rate, they are never likely to crowd you out of your home. Separated, they can't breed. Aside from that, with their popularity as pets, with the average college or agricultural school laboratory able to use from 100 to 400 a week, and with the experimental and diagnostic uses of the Hamster rapidly growing, it will take even this fast-familying little fellow a long time to over-produce himself. This is a relatively new field. Your Hamstery should prove profitable. •

Because of their extreme susceptibility to human diseases, these animals are extremely valuable laboratory subjects. Moreover they are easy to breed and raise, having clean habits and no animal odor.



Old-Time Railroad is His Backyard Hobby

By John Edwin Hogg



ON Ardendale Road, north of San Gabriel, California, passing motorists are treated to a sight which makes them stare, blink their eyes, and then stare again.

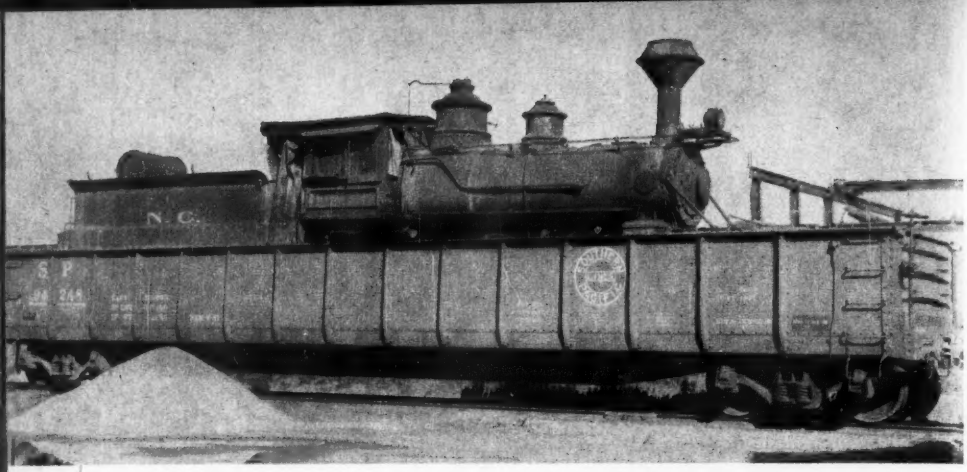
Puffing through the orange groves they see a ghost of the past. It is the locomotive, "Sidney Dillon," gaudily painted and guilded relic of one of the most romantic eras in railroading's history. Behind it rumble a tender, day coach, box car and caboose, equally old and colorful. Together, they make up the "Grizzly Flats Express."

Leaning from the cab they see the engineer, complete with cap, overalls and gauntlets. But not old-timer, he! It's 32-year-old Ward Kimball, Owner, President, Chairman of the Board, Conductor and what-have-you of the world's only full-size railroad which is operated solely for the romance of railroading. And the entire outfit is set up in his own backyard. If the day happens to be one of those beautiful California days with a temperature of about 80 degrees, a blue sky and sunshine, they are apt to see the funny old train festooned with happy, laughing people. This is the way that Ward Kimball puts on one of his periodical "tours" when he invites a trainload of guests for a choo-choo ride around his orange grove.

In the working world Kimball is an artist, possessed of certain skills found only in a handful of men. He has a vivid imagination and a flare for comic art. In 1934 as a young man just out of art college, he found a well-paid job as an animator with the Walt Disney Studios where he is still employed.

When he took up his railroading hobby twelve years ago, Kimball never hoped to own and operate a full-size train. That idea came in 1937 when he learned that the Southern Pacific-owned Carson Colorado was burning up a lot of antique day coaches. The price was $50 each including the trucks. He decided to buy one of the old cars and set it up in his yard for use as a rumpus room and bar. That's how he acquired his first unit of the present Grizzly Flats [*Continued on page* 70]

Here is Ward Kimball, himself, owner and operator of the "Grizzly Flats," surrounded by some of his "railroadiana." His spectacles are of 1892 vintage, and he's holding a Chicago & Alton timetable of 1886. At his feet is an ancient coal-burning-locomotive headlight. On the top shelf is the scale model of an 1890 B & O.



The "Sidney Dillon" looks like a midget compared to the Southern Pacific gondola which delivered it.

train, S. P. Coach No. 5, with enough track to provide it with "parking space."

Out of the old coach he got the idea of assembling a train, a thought that was realized when he learned that the Nevada Central Railroad was going out of business and had several old locomotives for sale. Thus, in the autumn of 1938 he acquired old "Sidney Dillon" by writing a check for $400. It cost an additional $450 to bring his prize to Los Angeles from Battle Mountain, Nevada, in a Southern Pacific gondola car. A huge motor truck completed the delivery to the Kimball estate. Later other equipment, including 650 feet of track, the cars, engine house, water tank, an old hand-car, etc., were added to complete the Grizzly Flats Railroad as it appears today.

At first consideration it may appear that Kimball's hobby is just another way for a wealthy man to squander a lot of money. But there's far more back of what he is doing than appears upon superficial examination. He is far more than a wild-eyed railroad enthusiast; he has built and is still building an invaluable museum of railroading—a collection of "railroadiana" as he calls it. It has already saved much of the educational history of railroading from being lost forever.

Because it has been impossible for him to find "parking space" for more than one full-size train, Kimball has added more than 110 models to this collection. Some of these are toys—valuable, nevertheless, because their manufacturers have made them as replicas of the designs of their era.

One of Kimball's most prized possessions is a working model of a locomotive extensively used during the 1890's by the Baltimore and Ohio Railroad. It was built by an old station agent who possessed an eye for accuracy and was a genius for intricate workmanship. On a scale of ¾ of an inch to 1 foot, this little engine has every detail and mechanical part appearing on the original drawings from which the full-scale locomotives were built. Today, more than half a century since [*Continued on page* 164]

When serious, Kimball is one of Walt Disney's more clever artists. His job is quite profitable and supports his hobby.

Radio Camera outfit lets the photo-minded girl snap a picture without missing her favorite radio show. It weighs less than 4 pounds, is 9½ inches high.

Conference Phone helps the boss keep tab on the office while out-of-town. His remarks come through speaker; answers of the office group are picked up by microphone and are relayed to him. An ordinary telephone carries the conversations. It is placed in the "Jordaphone" as shown in the picture. Work of the office is expedited by its use.

Sanitary Egg Washer passes eggs in back of revolving cloth disks. It doesn't break them and they don't lose their natural "bloom."

Visible Incubator gives you a look at baby chicks hatching. All phases of birth from first peck at shell to day old chicks are visible.

What's New in the '48 Cars?

BY TOM McCAHILL

FORD, Mercury, Studebaker, Chevrolet, Buick, Nash and Crosley have all introduced their 1948 cars, but you'll need a microscope to spot the changes from their previous models.

The '48 Fords and Mercurys have new serial numbers and a new ignition lock. Studebaker got its New Look back in 1946 and is still waiting for the other cars to catch up with its modern styling. Among Chevrolet's few changes are a T-bar across the grill and wider molding along the windows. Buick looks about the same but has a new type of automatic drive in its Roadmaster model. Nash has given its front another beauty treatment, and Crosley has added a couple of models, a sports utility and a new station wagon. That's the story at a glance.

Here's a roundup of what these seven "new" cars offer you:

FORD - MERCURY: The new serial number may be better, but the new ignition lock is inferior to those of the past. No longer is your steering wheel automatically locked when the ignition key is in your pocket—good news, no doubt, for car thieves. The other mechanical features and the bodies of both the '48 Fords and Mercurys are the same as the '47 models in every detail. In the past two years, I have questioned dozens of Ford and Mercury owners and have received widely varying reports on their performance. Some owners say the Ford and the Mercury are the best cars made in America. Others say they are the worst. Ford owners who knock their cars, however, are far more rare than those who praise them.

Frankly, I think some of the owners' gripes are caused by long-dead Ford features which the company is still plugging. For example, nearly every time I get a press release from Ford or a copy of some Ford executive's speech, I find a major part of the speech or release devoted to the Ford's economy of operation—a holdover in company policy from Model T days. There is nothing economical about operating a Ford when you compare it with its competitors. Among its immediate competitors, Ford would be nearer the bottom than the top of any listing based on economy.

If you're looking for the gasoline mileage that the Nash 600 or Champion Studebaker gives, you'll be disappointed with a new Ford, which will give you 30 to 40 per cent less mileage than these cars. On the other hand, I found that 95 per cent of the drivers

and master mechanics at the Indianapolis track own either Fords or Mercurys.

There isn't a car of any price range that can take the beating of hard driving better than a Ford. Fords will go over wagon trails and high-crowned cowpaths that would pull the guts out of the average car. None of its competitors can equal it on getaway above 35 mph, top speed and sustained high cruising speed. Fords and Mercurys always start in any weather with the first turn of the engine, provided the battery's good. You can't say that about the rest. Ford may not be *the* best car made in America within its price range and type—but it's *one* of the best. Expect 16 to 17 miles on a gallon, not 25.

STUDEBAKER: Both the Champion and Commander models still are cashing in on their sleekly modern looks. A convertible has been added to the 1948 line, but though it's a smart-looking job, it isn't as distinctive as the closed models. Studebaker owners generally have a good word for their cars. A few owners, who do most of their driving in open country where runs are long and speed limits mean little, are not too enthusiastic. They complain that, because of the low-swung bodies, headlights from other cars bother them at night and normal high speeds seem exaggerated in comparison to other cars and sometimes unnerving. Personally I have noticed that on very fast runs, you seldom see a Studebaker leading the pack or running along with a group of cars doing 65 or more.

On the other hand, salesmen for a certain large publishing company in New York all drive Studebakers on their coast-to-coast routes and swear by them. Of course, the Champion Studebaker, like the Nash 600, gives at least 25 to 30 miles to a gallon, and this means a lot to the salesman's pocketbook. The Studebakers seem to prove most popular around metropolitan areas, however, where their looks and styling are most appreciated.

CHEVROLET: The Chevrolet's daring innovation of a T-bar across the grill will serve to let bystanders and oncoming drivers know that *this* is a 1948 Chevrolet.

Mechanical changes consist of a pressure-cooling system, a heavier crankshaft, a newly designed valve-stem oil seal, a circuit breaker and a new type of ignition switch. This new switch really is something. It allows the owner to remove the key so that the ignition is still "on." This is for the convenience

Circle spots the new ignition lock on a Mercury, major change McCahill found. Ford has it, too.

Something new has been added to the '48 Chevrolet's look, but it's mainly that T-bar you see on the radiator grill.

Powel Crosley, Jr., head of Crosley Motors, poses with his new baby, a trim, all-steel station wagon.

of parking-lot cowboys. However, the key can also be removed with the ignition "off." (We recommend the latter procedure when the car is to be left unattended.)

As far as economy of operation is concerned, the Chevrolet is still one of the best all-around cars on the road. Parts are easy to get, not too high in price, and practically every wayside mechanic is familiar with the Chevrolet car.

Visibility is an entirely different story. This is especially true of the Fleetline model. The rear-curved windshield is practically horizontal and offers the operator about the same view that a tank driver gets when looking through his periscope. The lower roof of the Fleetline (which is 2½ in. lower than the Fleetmaster and Stylemaster models) is another factor which cuts down visibility forward. You can just about make out your left front fender. For seeing the right fender, I suppose the manufacturer some day will install a televisor with a screen on the dashboard to enable the driver to see where the right side of his car is.

NASH: We never tested the larger Nash model, the Ambassador, since we tried out only the most popular model of each make, which in the Nash line is the smaller car, the 600. Now, few people think of the Nash as an exceptionally fast car. Recently in Peru, however, a Nash Ambassador sedan won the annual 500-kilometer stock-car race against several other American cars at an average speed of 79 miles an hour. The smaller Nash 600 has proved in the last two years that it can give small-car economy with big-car comfort. I have questioned a number of salesmen who drive these cars in their daily work and sometimes cover territories hundreds of miles in area. Almost all the salesmen agree that they would like a little more horse power but are pleased at getting between 26 and 30 miles on a gallon of gasoline—which is much more important to them than horse power on a mileage expense account. One sales manager for an athletic supply company operating throughout New England told me that he kept precise records for 25,000 miles and that he averaged a shade more than 29 miles to a gallon, with upkeep less than $75 during this time. As we reported in our first test, the Nash 600 is a good bet for those more interested in economy and comfort than horse power.

BUICK: As far as appearance goes, the new 1948 Buick has the old 1947 look. On the mechanical side, Buick is introducing in the '48 model a new type of automatic drive in its Roadmaster, the Dynaflow—a new version of a torque converter. The key idea in the new drive is an oil-driven turbine, similar in principle but apparently better in practice than fluid units now used as the driving medium in some other makes. The Dynaflow eliminates manual and automatic gear shifting under normal driving conditions, but there is a conventional gear-shift lever for reverse and for an emergency low in [*Continued on page* 166]

MI Previews the Keller

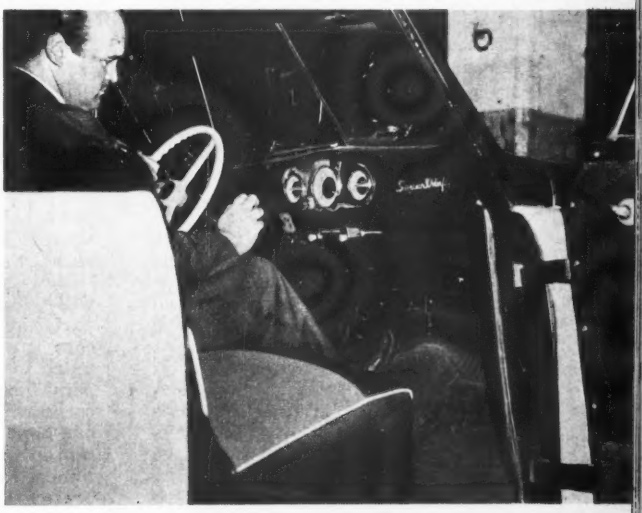
Tom McCahill inspects the Bobbi Kar's successor and passes some compliments.

A new little runabout is about to hit the road—the Keller. Take a good look at these pictures and maybe you'll recognize it; it's our old friend the Bobbi Kar with a new name.

Last year in answer to numerous requests, I tried to get the Bobbi Kar to sample for you, but couldn't swing it. It proved as elusive as a Democrat at a Republican convention. Now we know why! The original company got off to a bad start—what with steel shortages and all, and fizzled. The new outfit is headed by a former Studebaker man, George D. Keller, and at last it looks as though the Bobbi Kar—excuse me—the Keller, will become more than a dream.

There are two models in the Keller line: a sports convertible and a station wagon. This shows some clever thinking on the part of the management. Thousands of motorists are fed to the teeth with their "practical" family cars and sigh as they watch the smart convertibles hum by. The convertible is definitely in the luxury class and beyond the reach of most pocketbooks. Ditto for the station wagon. But Keller says that he'll sell his models for less than $1,000 apiece, and that will take them out of the "untouchable" class.

One of the really tough problems a new auto manufacturer has to lick, besides material and labor, is that of national service and parts. Keller has licked it by one of the smartest moves we've seen in years. He's building his cars entirely of parts available right now from coast to



Keller is not a "midget" car; it has lots of room. Seat is adjustable, almost as wide as Chevy's.

Station wagon is better looking of the two, Tom thinks. No fenders make the convertible appear a bit on the plump side (see photo on previous page).

coast. For example, his transmission is the same as that used on the 1941 Studebaker; the generator is the same as the one the 1940 Hudson uses; his wheels are interchangeable with any Crosley. And the same goes for just about every other part of the Keller assembly.

The engine is made by Continental. It is a 4-cylinder, L-head engine, developing 49 horse power at 3600 rpms, which is a lot for a small car. When I pinned the chief engineer down, he swore that it delivered 35 miles to a gallon.

All 4 wheels of the Keller are independently sprung and utilize the Goodyear Rubber Company's war developed, rubber-bonded-to-steel, trailing arm. This type of suspension is more widely known by the name "torsionetic." Tire size is 12x600.

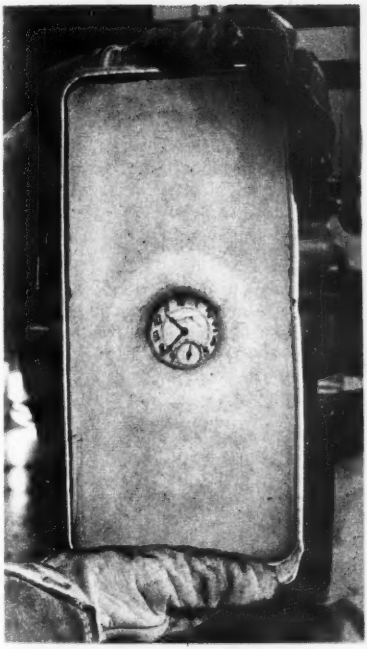
The Keller, though small, is not a midget car by any stretch of the imagination. Its overall dimensions are similar to the Jeep and the front seat is only two inches narrower than a Chevrolet. The leg room is quite ample with the aid of adjustable seats. The wheel base is 92 inches and the tread is 45 front, 46 rear. The road clearance is 7¾ inches, which is good when compared with today's standards for larger cars which rarely go higher and in some cases are lower. The bodies are made of 20 gauge steel which is insulated and rust-proofed. The Keller has some other features found on larger, more expensive cars: steering wheel shift lever, electric gas gauge, heat indicator, hydraulic brakes (and this *is* unusual in a car of this size), and sealed beam headlights with dimmer switch. The starter is worked by the clutch pedal.

The general appearance of the convertible, though not unpleasant, gave me the impression of being stubby and a bit on the fat side. The station wagon is the better looking of the two. The bodies of both are designed so that no fenders are needed and this may account for the plump look.

In summing up, the Keller offers a lot more dollar-for-dollar value than many of our cars selling for twice as much. Its power plant should make it just about as agile as a jack rabbit. I'm sorry a model wasn't available for me to road-test.

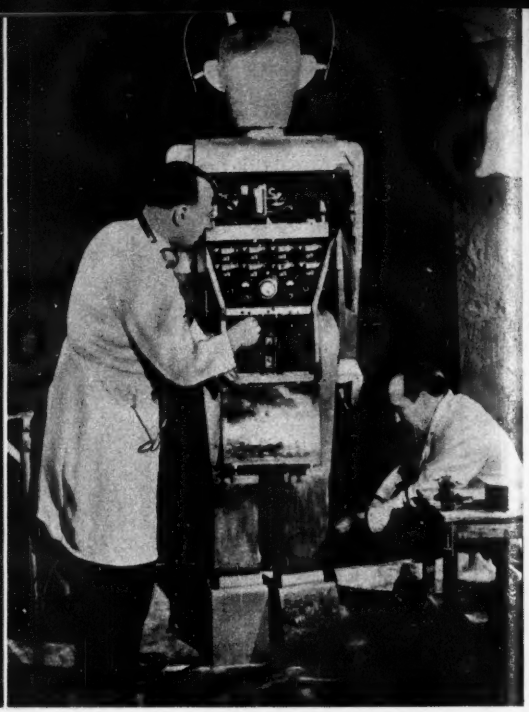
How these cars will stand up only time will tell, but when you consider that all parts have been used successfully in other cars, it would appear that there isn't too much to worry about. The Keller Company faces a tough fight in getting these cars over to the American public and I for one hope they succeed. Lack of competition in the automobile business is a very unhealthy condition for the consumer at present. And I do mean "high prices." •

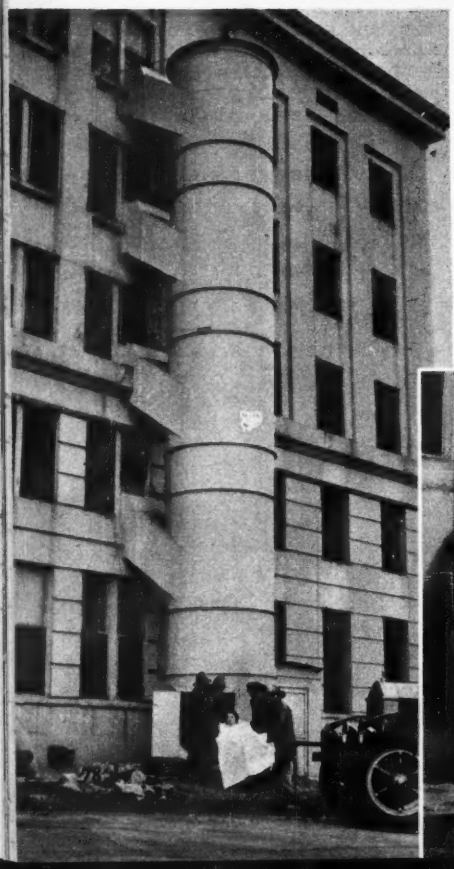
Golf Cart Collapses so snugly against the bag it carries that it takes hardly any added space. The handle fits back against the length of the bag; wheels fit together at base.



Frozen Watch, embedded in a block of ice during a test in a research lab, runs smoothly and keeps perfect time. It can do this because it is lubricated with a specially developed oil which does not congeal at extremely low temperatures.

Talking Lamp is studied by three 4-H Westinghouse scholarship winners while a radio editor explains how he used it in the secret transmission of a news story from one Chicago skyscraper to another.





Robot Turns Actor and plays the role of a "Martian" in a French production. Built by M. Koralek, noted French engineer, the 500-pound robot is seen at the left "rehearsing" with actress Mag Villars. At right, M. Koralek adjusts the robot's mechanical brain via its spinal column.

Escape Chute can evacuate the entire 136-bed Georgia Baptist Hospital, Atlanta, in only a few minutes. In case of fire, patients can be picked up, mattress and all, and slid to safety down the spiral chute.

new on the road

Parking Gage sounds a buzzer when you back too close to the curb. Hub caps and tire walls are protected by two, six-inch springs which close circuit when they touch curb.

Bike Motor for standard balloon tire bicycles, has 3½ hp, cruises at 35 mph, gets 100 miles per gallon. It features a multiple plate dry disc clutch.

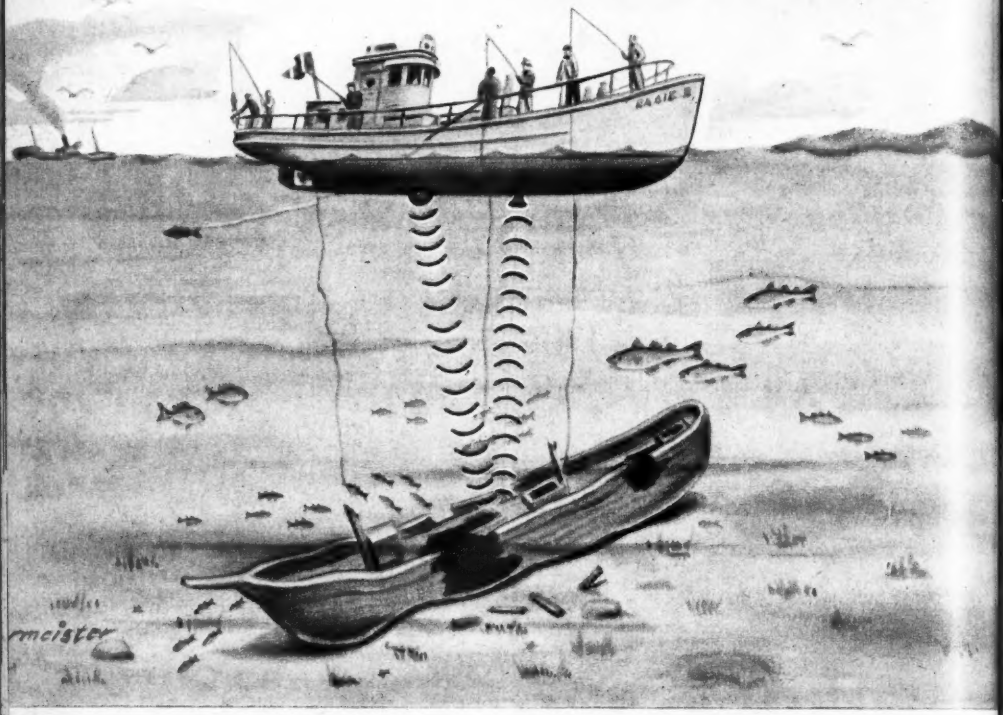
Puncture-Proof Tire has nails, ice picks and a chisel driven into it to prove its toughness. Chicago police also riddled it with bullets with no effect. This tire can take it.

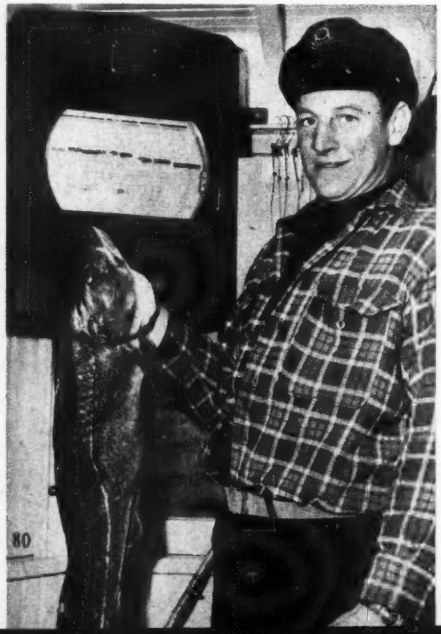
Talkie Cycle employs FM, eliminating "dead spots" such as under bridges, which occur with standard short wave. It will even operate in a thunderstorm. Antenna is 18 inches long. The set weighs only 27 pounds. It is expected to speed up police operations.

Supersonic Fish Finder

If you can't catch big ones now it's nobody's fault but your own.

BY EUGENE E. UTZ





NO more fishless hours of searching, no more haphazard dropping of lines in the hope that fish are beneath the boat. In short, no more fishless days. A single fish or a school, the depth and whether the fish are big ones or just sardines—all this can be seen at a glance by a man standing at the ship's wheel.

A two-foot square cabinet hung at eye level beside him describes the situation instantly and records it on a sheet of paper visible through a small glass window.

When the captain tells his guests: "Drop your lines, boys, the fish are down there," he isn't guessing, he knows.

How is this possible?

It's done with Bendix Marine Corporation's new Supersonic Depth Recorder which makes "visible" 1200 feet of ocean

The Depth Recorder charted everything down to 1200 feet—including this whopper at left.

Those heavy lines Capt. Carl Forsberg is pointing out are proof that a wreck lies on the ocean floor below the Viking I, the first party-fishing boat to install the new fish finder. Above: Sister ship, Alert II, will soon have one too.

Photos by Newsday

beneath the ship. Any attendant fish are noted at their proper depth.

Essentially, the recorder consists of two parts: the recording unit, which weighs 90 lbs. and is easily installed in the wheel house or other convenient location, and the small blister-like transducer which is installed on the underside of the craft to send and receive the sounding signals.

Basically, the instrument depends on the known speed of sound in water, approximately 4800 feet per second. Neither radio nor radar, it comes closer to being a radar instrument, although any competent radio service man capable of repairing ordinary electronic devices such as ship-to-shore telephones or radio compass equipment, can service the recorder.

By using the known speed of sound, the instrument automatically measures the depth of the water by the time required for the echo to "bounce." The instrument produces the sounds, receives and amplifies the echo, measures the time lag and converts all this into units of depth, either feet or fathoms.

An electronic oscillator produces electrical impulses which are converted into supersonic waves in the transducer and beamed toward the bottom. When recordings in feet are desired, 288 impulses per minute are transmitted; for fathoms, only 48 impulses are used. This shift from feet to fathoms is accomplished by a simple gear shift arrangement similar to that used in automobiles.

The supersonic beam travels toward the bottom until it strikes anything with a density different from that of water. A portion of the beam is reflected back to the transducer as an echo. In the meantime a crystal within the transducer has keyed over to receive the echo.

The time lag between the sending of the impulses and the reception of their echoes is automatically computed. This is passed on to an electric stylus which burns through the [*Continued on page* 166]

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Removing Paint
Painting a New Surface
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Painting Metal
Preparing Plaster
Fillers, Staining, etc.

(Above) A simple little trick like knotting the wire inside extension plugs can save you severe burns, blown-out fuses, and fire hazards. Protect your home and family with the advice in this book!

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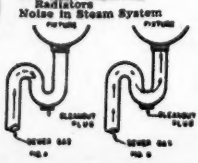
Cleaning, Adjusting Radiators
Noise in Steam System



Hot Water Heating System
Repacking Leaky Valves
Cleaning Boilers
Cleaning the Furnace
How to Insulate Your House
How to Build and Install Storm Windows
Efficient Weather Stripping, etc.

PLUMBING

Water Supply
Cause of Dirty Water
Repairing Sewage System
Cesspools, Septic Tanks
Stopped Up Sewer Pipes
Stopped Up Drains
Chemical Drain Cleaners
Plumbing Traps
Noisy Plumbing
Repairing Hot Water Tanks
Thawing Frozen Pipes
Water Softening Equipment
Repairing Faucets, Flush Tanks, Leaky Pipes, etc.

EXTERIOR REPAIRS

Waterproofing Damp Basements
Waterproofing Masonry Walls
Repairing Cracks in Foundation, Stucco Walls
Repairing Brick Walls
Repairing Leaky Roofs
Caulking Seams
Gutters and Downspouts
Ridding the House of Termites, etc.

YOUR GARDEN

Building Garden Paths
Building Garden Pool
Care and Use of Garden Tools
Cold Frames
Rustic Screens and Arches
Building an Outdoor Fireplace
Erecting Garage, Summer Guest House or Play House in Garden, etc.

Learn the correct way to care for brushes, tools, etc., to make them work better and last longer. This information in the book saves you money.

(Left) You SEE diagrams that help you locate and with little effort, fix plumbing noises, leaks, and drain stoppages.

with the aid of the

COMPLETE HOME

Here's How This Book Will Save You Hundreds of Dollars

THIS amazingly comprehensive volume shows you how to do yourself all of the jobs around the house that have long needed doing—and a lot more you've wished *could* be done. In simple, practical language and pictures it shows you not only how to make your own repairs on your Plumbing, Wiring, Electrical Appliances, Masonry, Plaster, Heating System, Furniture, etc., but also how to *make valuable improvements* in your home, from a new closet to a whole new roof—from a new floor to a whole new modern kitchen.

No longer need today's high labor costs keep you from having the kind of home you'll be proud of—attractive, smooth-running, free from hazards, and equipped with every comfort! This COMPLETE GUIDE makes even the most unfamiliar job easy to do—and *fun* to do! You not only save time and money, you also enjoy the thrill of watching your home acquire new luxury, comfort and value.

OWN HANDYMAN!

Here's Everything You Need to Know to Do Your Own Repairing, Beautifying, Modernizing, Converting! The A to Z of CARPENTRY, PLUMBING, PAINTING, DECORATING, WIRING AND APPLIANCES, MASONRY, FURNITURE REPAIR, HEATING SYSTEMS—*all in one book!*

HANDYMAN'S GUIDE

Make a New Kitchen, Game Room or Bathroom! Build an Extra Apartment and Live Rent-Free!

Here's 1,001 methods to help make your house more liveable—and add hundreds, even thousands of dollars to its value. Need new closet space? Want to eliminate that dangerous draft in the baby's room? Redecorate sister's room? Build a garden walk? Lay a new linoleum floor? Get better winter heat for less money?

Want to convert your basement or attic into an extra apartment and give yourself a rent income that may well offset a good part or all of your taxes, mortgage payments and other expenses?

You can make these improvements yourself, at surprisingly little cost, with the help of *The Complete Home Handyman's Guide.*

Easy Step-by-Step Instructions in Clear Pictures and Simple Text!

This book assumes no mechanical knowledge or skill on your part. It starts from the very beginning, explaining how to select and use tools and materials. It gives you detailed information every step of the way, from repairing a lamp or iron to installing a complete wiring system; from repairing a chair-leg to rebuilding your upholstery; from buying a paintbrush to repainting the house inside and out. More than 1,000 ILLUSTRATIONS, accurately and explicitly drawn, make the complete instructions easy to follow. This is the *number one* book for your home. It will repay its astonishingly small cost many times over within a short time!

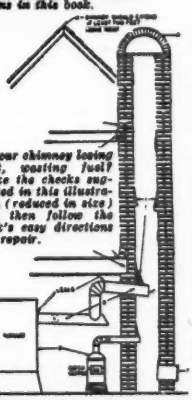
(Left) Furniture upholstery and repair is a fascinating and money-saving hobby when you follow the easy step-by-step instructions in this book.

FURNITURE CARE AND REPAIR

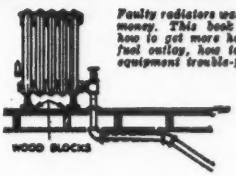
Upholstery of Chairs, Sofas, etc.
Replacing Worn Springs
Strengthening Frame
Furniture Upkeep, Cleaning, Removing Water Stains, Marks, Scratches, etc.
Loose Joints
Broken Chairs
Polishes and Polishing
Staining, etc.

YOUR TOOL KIT

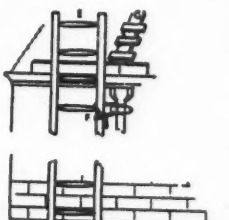
Equipping Your Workshop
Selecting the Right Tools
Correct Use of Tools
Care of Tools
How to Sharpen Tools
Sandpapers, Glues, etc.
Soldering Equipment and Technique



Is your chimney losing heat, wasting fuel? Make the checks suggested in this illustration (reduced in size) and then follow the book's easy directions for repair.



Faulty radiators waste heat and money. This book shows you how to get more heat for your fuel outlay, how to keep your equipment trouble-free.



Avoid hazards. This illustration shows how to secure a ladder when you make roof repairs. Complete instructions for repairing walls, foundations, gutters, shingles, etc.

How to equip a workshop, how to use all types of tools, how to use sandpaper and glues—all are fully covered in this "show-me-how" volume.

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Think of getting in this one big 512-page volume all the practical information you need to do a good professional-looking job of repairing or improving any part of your home—from cellar to chimney-top! Think of getting all this—not for the $18.00 or $24.00 you would expect to pay for 6 or 8 books covering all these fields—but for the miracle price of only $3.95! But don't take our word for this big value. Examine FREE, at our risk and expense, a copy of the *Complete Home Handyman's Guide.* Just mail the coupon below. When the book arrives, test it a full week FREE! If you don't agree it's the best money-saving buy ever, return it without further obligation. If you keep it, pay the small price in small monthly installments. But act at once. Our limited printing is inadequate to meet the demand. Wm. H. Wise & Co., Inc., 50 W. 47th St., New York 19, N. Y.

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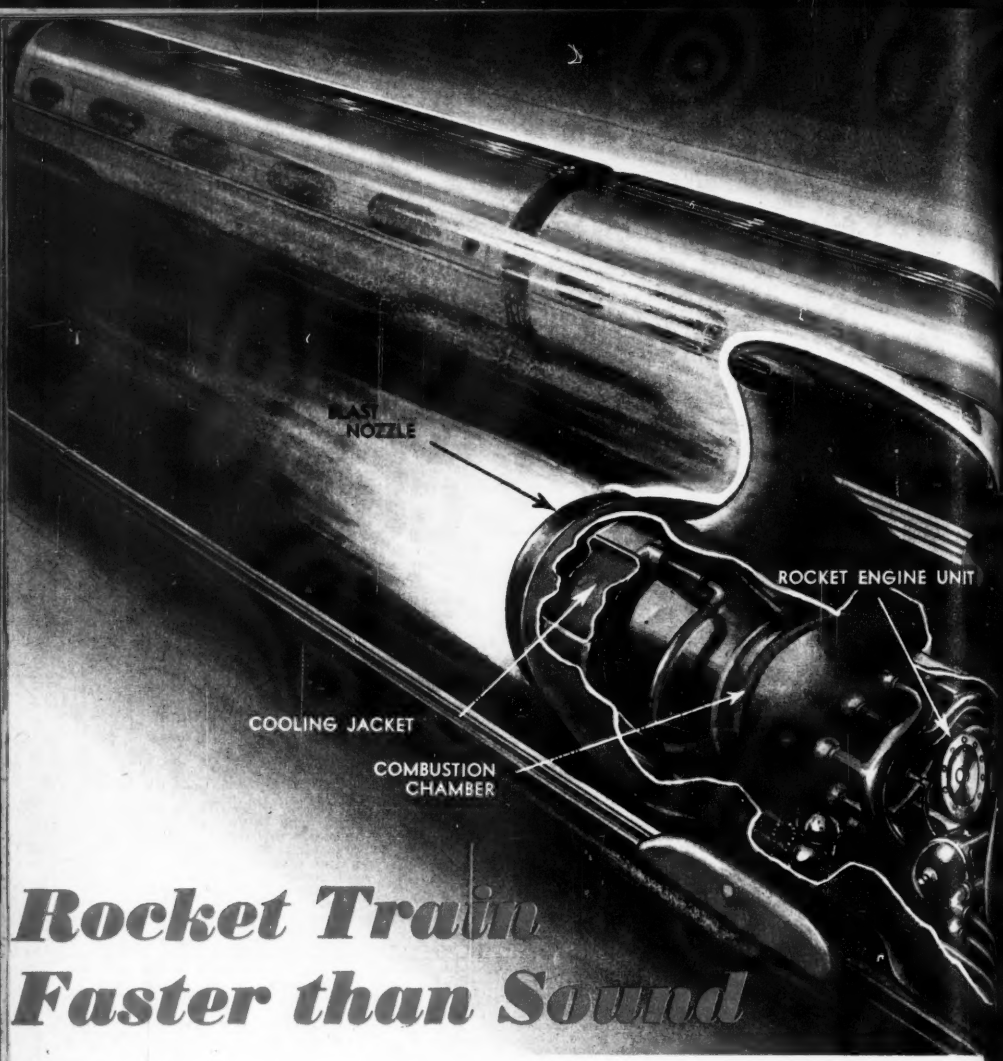
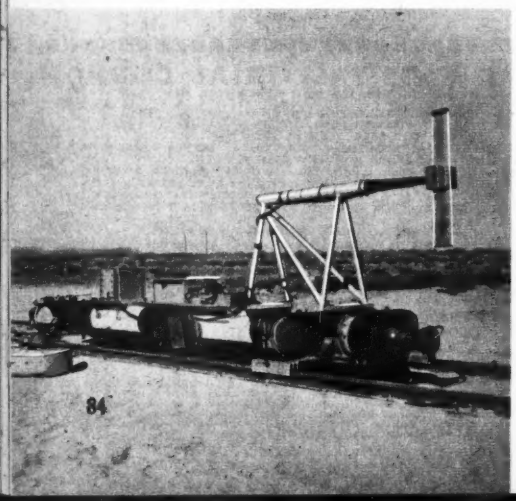


Rocket Train Faster than Sound



TOMORROW'S train will be too fast for a timetable. Leave New York at 12 noon for the coast, and you'll arrive in Los Angeles at *the same time, the same day!*

How's that? At 1,000-mph your train will travel as fast as the sun in its apparent motion across the earth from east to west. You'll pace the sun through every time zone from Eastern Standard to Pacific Time as your wheel-less train glides across the continent in three hours on its graphite-lubricated slippers. It'll take the sun three hours to race the same distance, and you'll flash into L.A. in a

This supersonic sled serves as an "outdoor wind tunnel" for model "wing" on boom at front end.

dead heat—at the same time you started!

Such a super train is depicted here by MI Artist, Doug Rolfe. Its pattern is the Army "sled" recently tested at Muroc Air Base by the Northrop Aircraft Co. With five solid-fuel rockets it streaked along its standard-gauge railroad track at 1,019 mph, far *faster* than the speed of sound.

The sled originally was designed to help plane engineers crack the 750-mph barrier of sound and test air models at supersonic speeds. Before the sled shot off the rails and buried itself in the desert, however, it set a world's record for speed on land and opened the way for a revolution in transport and rapid dispersal of our sardine-packed cities. •

Chilly Nonchalance is displayed by three Navy flyers as they model new emersion suits in the icy Atlantic. They say they're comfortable even though the water temperature is 30 degrees. Weight: 2 lbs. The suits will come in handy in Arctic maneuvers.

Electric Mask is just what the doctor ordered for sinus pains, colds, facial neuralgia and headaches. It covers the front of the head and cheeks. Just plug it into a wall socket.

Hearing-Aid Radio
This tiny radio adapter plugs into the side of a hearing aid, and now people who wear these gadgets have an advantage over their friends who hear normally. They can tune into their favorite program whenever they desire.

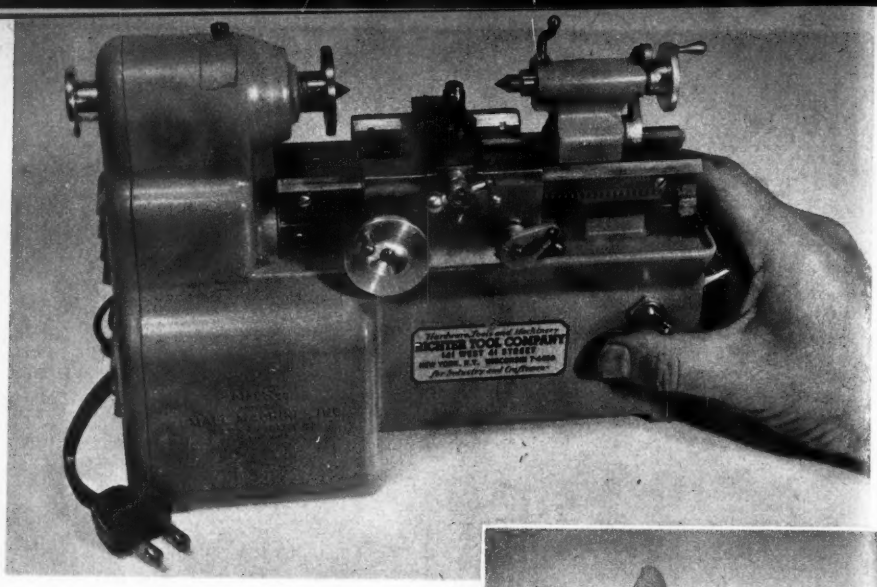
Rocking Razor allows a guy to dry shave any time, any place. Its two blades, working inside a perforated guard, cut the beard by a scissors movement when the razor is rocked gently against the skin. At the same time, the British manufacturers claim, the guard sharpens the blades, giving them a life of several years.

Painted Grass is "grown" in Hollywood by spraying the real stuff. When color films call for different grass shades than Nature provides, special effects men get busy with water paint.

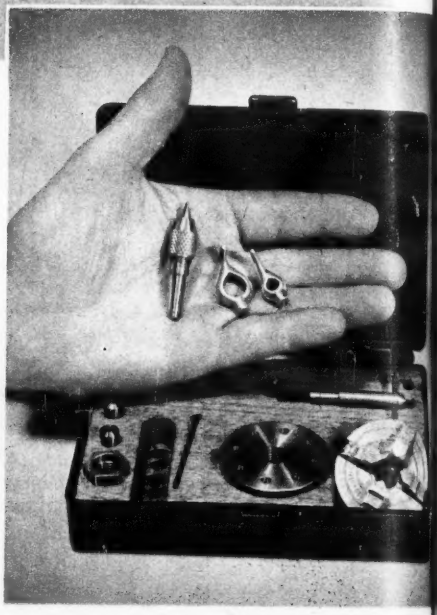
Choo-Choo Cake was given Maj. General Carl R. Gray, Jr., when he left a Railroad Co. to become Veterans' Administrator.

Light Diesel is designed for use where power is unavailable, weighs 607 pounds, produces 15 horsepower.

Sweating It Out in a special chamber at U. of Cal., a student is "cooked" at 250 degrees for 14½ minutes for AAF supersonic research.



Lilliputian Lathe is only nine inches long, three inches between centers, but is complete in all details and is especially suitable for fine model work. Carriage is power fed. Motor is in base, under headstock. Regular lathe accessories, pictured on right, include chucks, collets, dogs, face plates, etc. Machine sells for about $60.



Shockproof Needle reduces your record breakage and won't bend when dropped because it bounces. Impact is absorbed by nylon bumper which connects the duraluminum shank with the steel spring tipped with precious metal. The needle is also noiseless, offers good fidelity and is good for 5,000 plays.

Mechanics of Killing

[*Continued from page* 55]

cutioner used either a huge two-handed sword or an axe, the head of which was eight inches wide at the blade and about a foot long. Sometimes the condemned man simply knelt and lowered his head, a method the Japs still use. More often, though, a chopping block was added.

This usually was a long piece of timber with foot-high supports at each end. A small log of wood was fastened across the upper end, on which the neck was laid. During Queen Elizabeth's reign, a low, grooved block was commonly used to hold the victim's neck in the proper position. The victim lay on the ground with his neck resting on the block. Other types forced the condemned person to kneel while the executioner's assistant tied victim's hands to the sides of the block.

As the scientific age began in the twentieth century, a strange thing happened. Humaneness, up till then unknown where the death penalty was concerned, was introduced into executions. Science now sought to make killing more expert for the state and more merciful for the condemned.

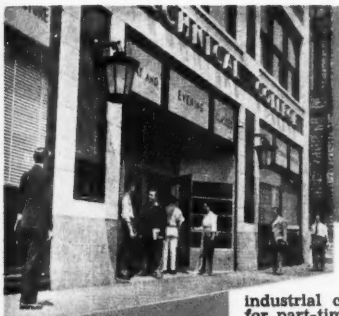
After many experiments and tests, the electric chair finally was adopted to replace hanging in most of our states. Here was a way of meeting death that took advantage of man's new knowledge of electricity. Naturally, there is a lot more to electrocution than merely throwing a switch.

Before the date set by law, the executioner, who must be a trained electrician, gets data on the victim's exact physique so that the electrodes will fit perfectly. This must be done as close to the day of execution as possible, since condemned men often start shriveling away as they await their doom.

Unlike the hangman's rope, the electric chair is always the same. It is made of stout oak and has eight straps by which the victim is bound at the chest, the waist, each upper arm and each ankle.

At the death signal, the guards step back. The executioner throws the switch to the maximum voltage, usually 2,000. After five seconds, he decreases the voltage to 1,000 to prevent sparking and unnecessary burning. He holds the current at 1,000 for 30 seconds, then steps it to 2,000. He repeats this alternate increasing and decreasing of the current for four or five successive shocks, and then the doctors examine the body and pronounce the death of the criminal.

[*Continued on page* 168]



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new for the home

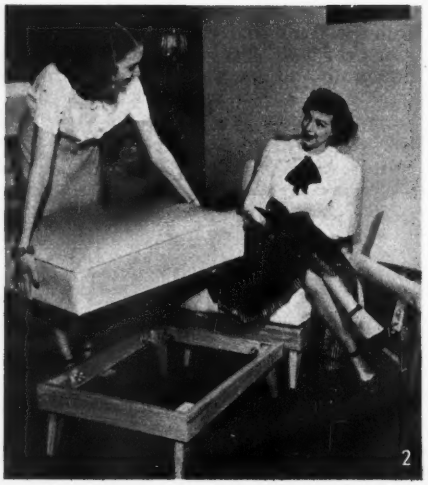
UTILITY and beauty in modern styling for your home are in evidence in the new furniture shown on this page. They are a part of the Chicago Furniture Mart show held recently.

The old problem of what to do with your extra table leaves when not in use has been studied by furniture designers. The result is the modern buffet shown in Picture No. 1 which provides storage space. Just slide the leaves under as the girl is doing.

If you like variety in your furniture, the sectional sofa in No. 2 has a versatile quality you'll enjoy. It can be taken apart and reassembled in a wide variety of pieces. The girls are shown busily making a chaise longue out of an occasional chair.

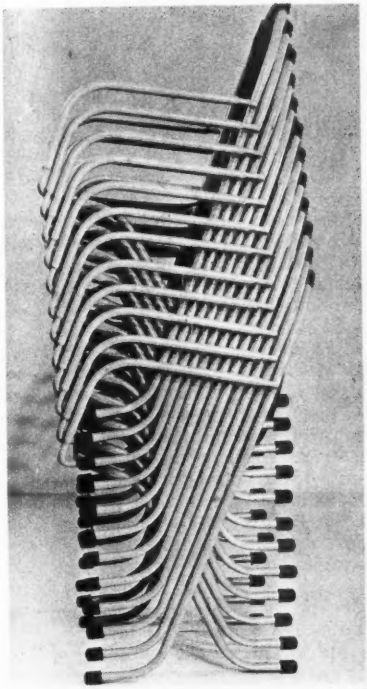
Junior and his friends will go for the 180-gallon portable wading pool shown in Photo 3. It's constructed of a 9½-lb., slightly inflated tube of Koroseal. Weight of the water keeps the sides erect.

A pretty girl repairs her beauty at the new style dressing table shown in Picture 4. The mirror folds out of sight when the table is not in use, giving the piece a neat, modern look. •

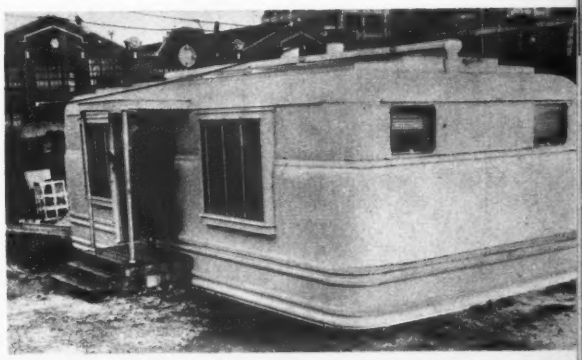


Heating System for railroad cars insures you a comfortable ride by throwing heat from every square inch of the car's inner surface. Heart of the system is a new thermostat which keeps the car within two degrees of the temperature called for on the stat setting. It will soon be available for home use.

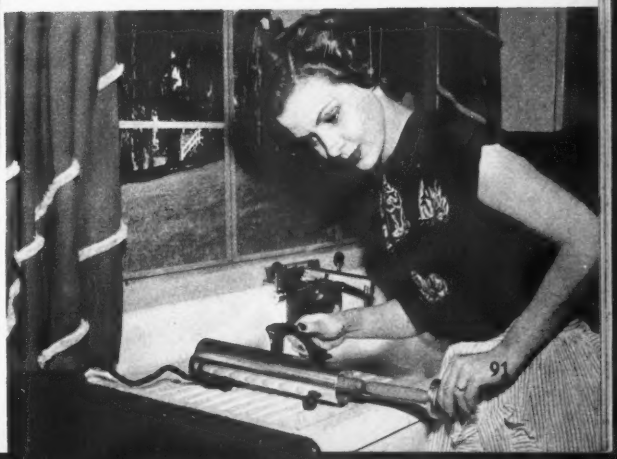
Stacked Seats: When the pile below is untangled, 12 all-steel chairs appear. As many as 30 can be stacked without effort, the British manufacturers say.

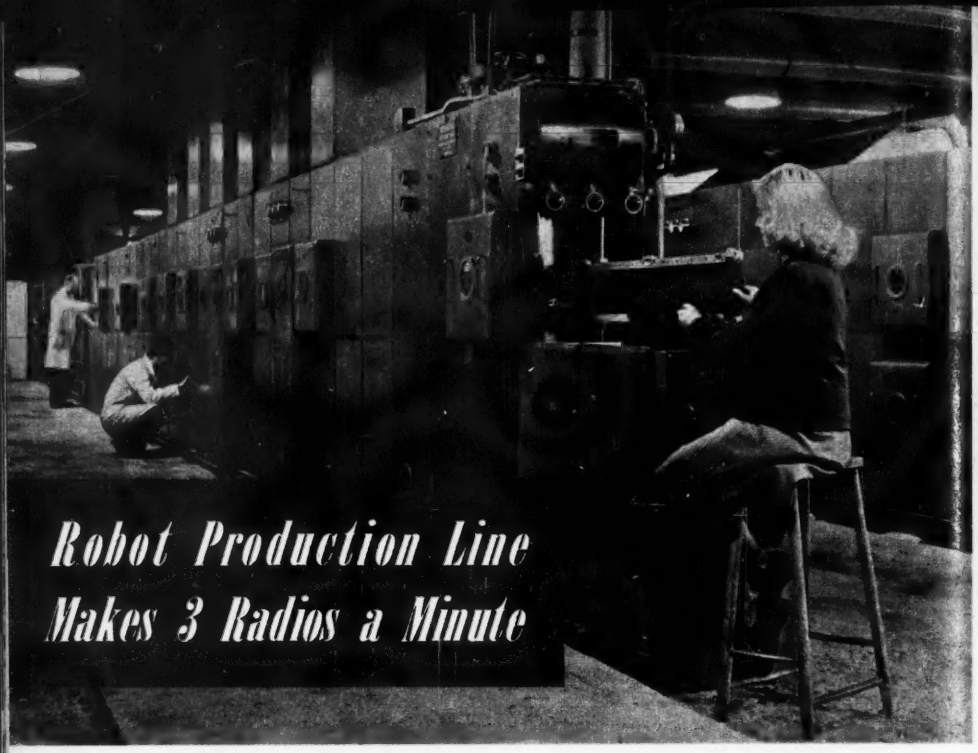


Aluminum Home is shipped completely equipped, measures 29½ feet by about 15½ feet. It contains a kitchen, living-room, bedroom, bathroom, ample closets and heating unit. Costs less than $6,000 shipped.

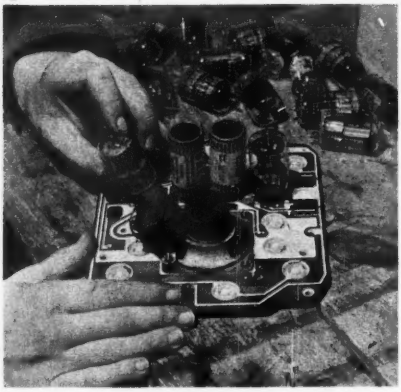


Hot Dog Roaster cooks two weiners by electricity in three to five minutes. Just slide them in as the girl is doing. It's available for either the home or for boats and cars.





Robot Production Line Makes 3 Radios a Minute

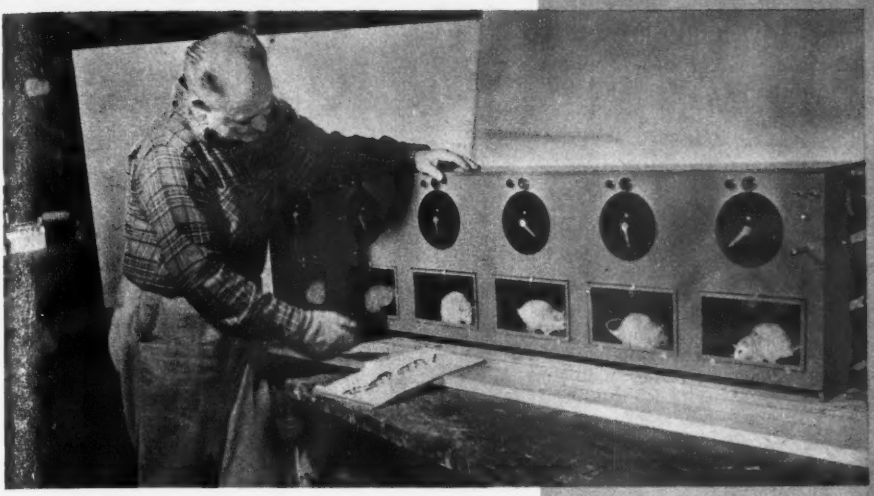


THE so-called "printed" radio sets are still new on the American scene, but they are rapidly becoming common items in England. A new factory near London is using a robot machine (above) which takes the plastic molding in one end and delivers the printed circuits from the other end at the rate of three a minute. It would take about 2,000 workers to do the same job by hand.

In the printed circuit there are no wires. The electrical conductors are channels of metal imbedded in a non-conducting panel which constitutes the base of the set. It is no wonder that the British quickly saw its adaptability to mass production methods. The plastic base of this set with its printed circuits is shown at left. An assembler is inserting the two tubes and condensers.

The robot is really a 70-ft. long series of 20 separate machines, each one performing its individual task. The operations can be observed through windows in the sides. Special "memory" units safeguard each process by preventing piling up on the conveyors, stopping operations if one unit fails, and reporting the positions of defects.

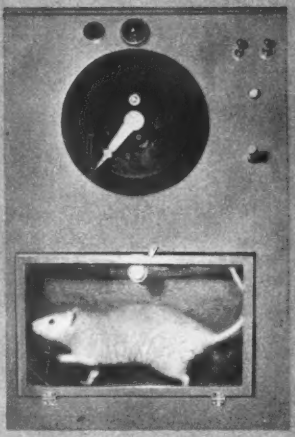
Father of the robot is John Sargrove, a Londoner. He calls it the ECME which means: Electronic Circuit Making Equipment. •



it's a RAT RACE!

HIGH prices, hard scrambling for the daily dollar got you hectic? Life may be a real rat race for you, but rat racing is just the life for Edward Moffitt of San Francisco. He lines up six favorites from his unique stable of 80 albino racing rats and adjusts the dials on his mechanical racetrack. Bong! There's the starting bell.

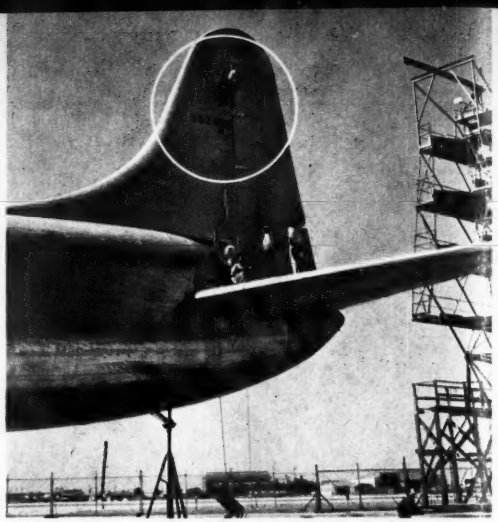
Mister Rat breaks fast, scurries ahead of the pack. Blue Boy moves up. Faster, faster they spin. It's Blue Boy and Express. But there, lashing his tail in a frantic sprint, is Commuter. Bong-bong! Commuter's name flashes above his dial—the winner! But what's this—Commuter has raced 50 laps on the 150-foot course, but he's still right where he started. That's a rat race for you, brother! •



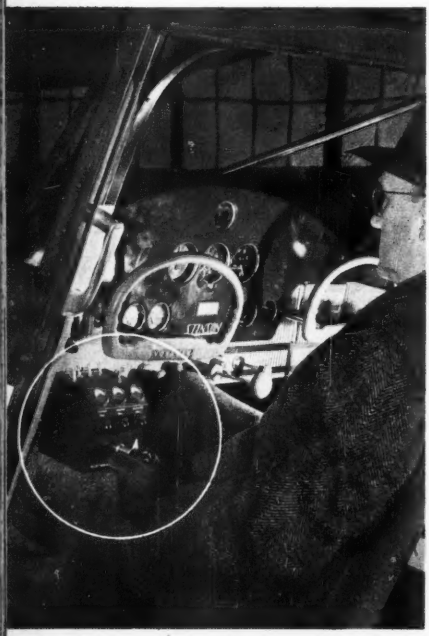
Pointer shows Commuter passing halfway mark in treadmill race.

Moffitt puts water in one cage of his "paddock" where his racing rodents await the next mad sprint in his rat race.

new in the air

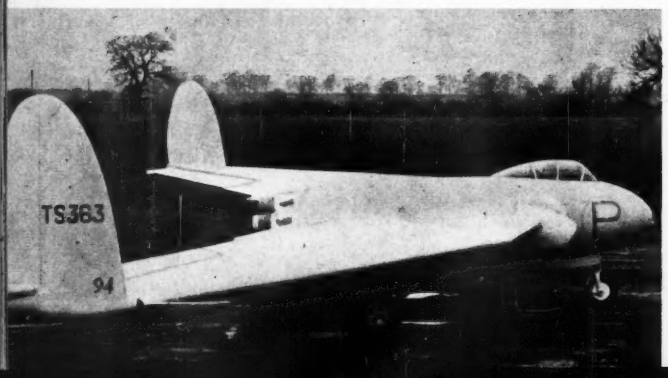


Boatswain's Chair is used by inspectors to check the 57-ft. tail fin of the Air Force's XC-99 transport, the world's largest land plane. Chair is hoisted from a pulley built into the fin for that purpose.

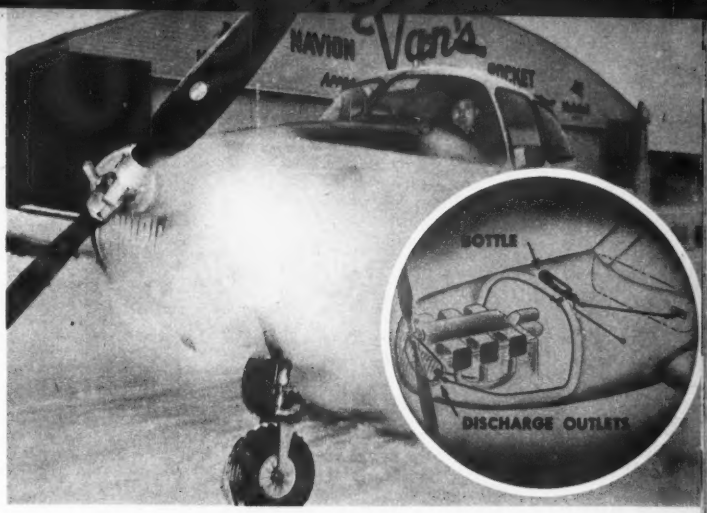


Flivver Helicopter designed for industrial and agricultural uses, later for private owners. It is said to be easier to handle, safer and more rugged. Price will be lowest in the field—between $7,000 and $9,000.

Midget Autopilot shown at left on a lightplane functions similarly to its big brother used on military and transport aircraft. Weight is 35 lbs. In level flight it senses any sudden air current and automatically adjusts the controls within half a second. It is unaffected by rapid maneuvers or high rates of acceleration.



Flying Wing of British has fins and rudders in its wing tips. Speed is 500 mph and weight is 33,000 lbs. It is powered by twin jets. The cockpit is pressurized.



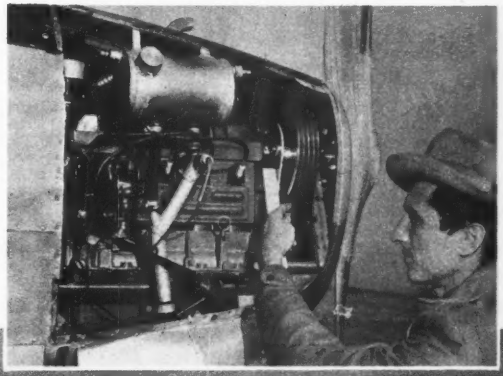
Fire system for small planes releases carbon dioxide to smother flaming engine. Insert shows artist's sketch of system with carbon dioxide bottle, piping arrangement and discharge outlets. Photo shows system in action on a Ryan Navion.

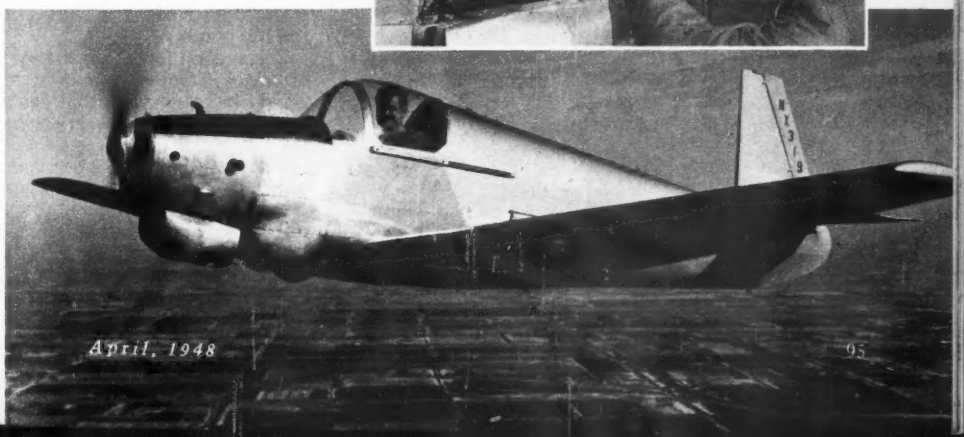
MOONEY SINGLE-SEATER

AL MOONEY, Wichita aeronautical designer, has built himself this low-cost single seater which features exceptional operating economy and simplicity in construction. Mooney designed the ship around the engine which is a 26-hp Crosley, the same as in the Crosley car. He developed a steel wedge-belt reduction gear which reduces the engine's 3900 rpm to 1950 at the prop.

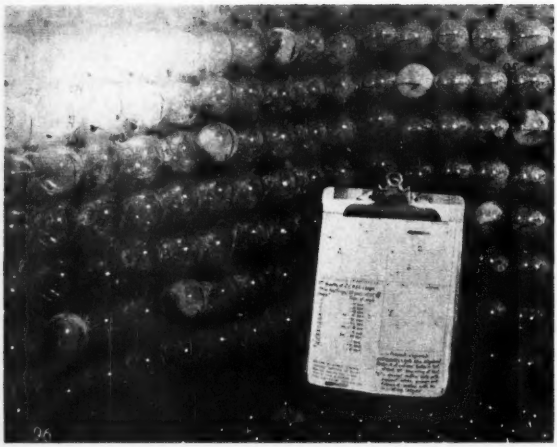
Gas consumption is less than two gallons per hour at cruising speed. "For $7 or $8 worth of gas I can fly from coast to coast," Mooney says. In addition, he claims his job will sell at about half the cost of the cheapest plane on the market today. Metal is used from the nose to the back of the pilot's seat. The rest of the ship is wood. Weight is 450 lbs. empty, 700 lbs. gross. It has a 27-ft. wing spread and is 18 ft. long.

A revised version of the two-control system is used. With this the entire tail is controlled as a single unit. The plane cruises at 90 mph and lands in the low 30s on tricycle landing gear. •





Radar Ignites Flash Bulbs in Aircraft



FLASHBULBS and aircraft like liquor and automobiles, don't mix.

Enroute from Los Angeles to New York, fire broke out in the baggage compartment of a DC-6. The pilot tried for an emergency landing but just missed the strip and crashed in Bryce Canyon, Utah. All 52 persons aboard were killed. Flashbulbs ignited by radar were given as the probable cause of the tragedy last October. The completeness of the plane's destruction is shown in the top photo.

Tests conducted by the Air Materiel Command at Wright Field, have proved that such could have been the cause as the picture at the left shows.

The test board shown contains flashbulbs being exposed to radar. The light patch at top left shows a bulb being ignited. Burned out and exploded bulbs are scattered throughout the rack. Wire and foil filled bulbs are both highly susceptible. •

$500 FOR ONE PAPER DOLL

Jack Eisner might make you a doll for $200, but his regular price is more, and his customers keep him very, very busy.

BY LOUIS HOCHMAN

SOUNDS silly for a man to spend his time cutting out paper dolls. Stuff for kids and crazy people. But it's silly like a gold mine for Jack Eisner of Kew Gardens, Long Island. He cuts out paper dolls and sells them for $500 apiece.

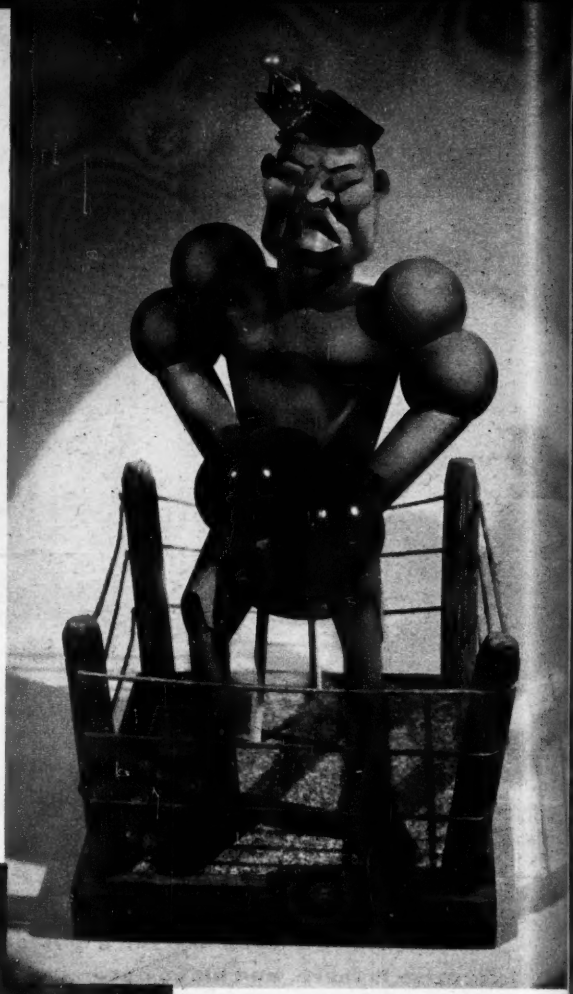
His first paper doll was a caricature of Jack Oakie, the film comedian. Eisner admits it was pretty crude, but it impressed the art director at Paramount Pictures.

"You've got something there," the art director told Eisner and doled out twelve whole dollars for his paper doodle.

That was Eisner's first paper profit. Since then, he has bettered both his technique and his income. Now he gets from $200 to $500 for a single caricature.

A toy and game designer by trade, Eisner is an imaginative artist with his scissors. With a snip here and a snap there he caricatures famous people in paper cutouts. Basically his unique three-dimensional technique stresses already grossly exaggerated features of his cutout victims by building up planes of curved and twisted paper shapes.

Constantly experimenting with new materials for his comic portrayals, he will use anything that stirs his imagination. A red reflector button for an automobile becomes a big "diamond" stickpin for film "gangster" Edward G. Robinson. A couple of fake pearls from a cheap necklace make Fannie Brice's "Baby Snooks" pop-eyed. Whether it's one of his wife's



Eleanor Roosevelt's smile beams here bigger than life in Eisner's cutout.

Ping-pong balls put that old power punch in this paperweight Joe Louis.

Sinatra the thin Mikeman sings sheer nonsense to pal Crosby the Pipeman.

Photos by Louis Hochman

shoe trees for a nose, or a broken toy, a pipe cleaner, a bit of wire, a scrap of wood or cloth for some other caricatured feature, Eisner carefully hoards every old piece of junk around his house until he can put it to hilarious use in a bright new paper doll.

Eisner can make paper do everything but talk. Many of New York's Fifth Avenue shops feature his paper creations in their window displays, and advertising agencies often use his skill to dress up fancy pictures for color ads. Even the New York Museum of Science and Industry waived its no-art policy to exhibit some of Eisner's comic caricatures.

Clever clown's pipe-cleaner hair is standing on end as his cycle teeters.

Smirking Joe Stalin wields a wicked sword in this paper-and-wood pose.

Organ-grinder Lew Lehr makes like a monkey for lace-cuffed Ed Wynn.

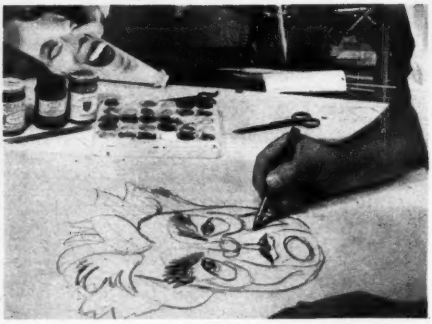
Highlight of Eisner's artistic career, however, was when he cracked the upper crust of the art world by gaining recognition in the exclusive American Artists publication and getting his cutout caricatures displayed at the Gallery of Modern Art on New York's high-browed 57th Street.

When Eisner walked boldly into the gallery and asked the proprietor to exhibit his three-dimensional caricatures, the art dealer cried:

"Caricatures! What are caricatures?"

A few samples impressed him, but he was still doubtful. Finally he agreed to try them in a brief exhibit. The short-order show

step-by-step construction...



FIRST, Jack Eisner takes a sheet of tracing paper and roughs out in pencil the key features of a character. Here he sketches John L. Lewis.

SECOND, Eisner cuts out the characteristic jutting jowls of the miners' leader after transferring tracings of the sketch to heavy drawing paper.

THIRD, the cutout features are bent according to the shape of the face, then glued into position. Minus brows and mane, Lewis looks sad, not mad.

FOURTH, final features are adjusted before paper portrait gets its color makeup. Picture on Page 97 shows Eisner airbrushing John L.'s defiant mane.

ran for ten days and filled the gallery with record crowds. Bennet Cerf, noted author and publisher, saw the exhibit and had Eisner decorate his office with caricatures of his favorite authors, such as Sinclair Lewis, Quentin Reynolds, Cecil Brown and Eliot Paul.

Before cutting out a paper personality, Jack Eisner first sketches an outline of his caricature on a sheet of tracing paper. For reference, he studies his file of news and magazine pictures of people in the public eye. In this sketch he also outlines characteristic traits that are to be cut out separately and added later as successive three-dimensional planes. Then he turns the sketch over and rubs the back of the paper with a soft-lead pencil so that he may transfer tracings of the sketch to heavy drawing paper.

His pet tools are long shears and sharp knives. He has tried many adhesives but now favors cellulose cement which quickly dries clean and flows into corners to form a solid, waterproof bond.

If you have time to cut up, take some paper and a pencil, grab the scissors and see what you can do yourself. You don't need any fancy tools or materials—just throw in an odd piece of junk for an extra laugh, zip open your imagination and snip away. Maybe you won't ever get $500 for cutting out your paper doll, but you can have fun trying! •

Nobody gets hurt in these crackups

BY
PHILIP H. BAILEY

A SLICK new Ford Mercury station wagon careens across the bridge. Tires screech as the car lurches, skids off the road. The station wagon crashes on its side, hurtles down the steep bank, then bursts aflame at the bottom of the canyon.

Terrific is the word for that screen crackup. In spite of yourself, you cringe in your seat at the grim realism of the crashing car. How can anybody survive a wreck like that? Such a beautiful new auto, too.

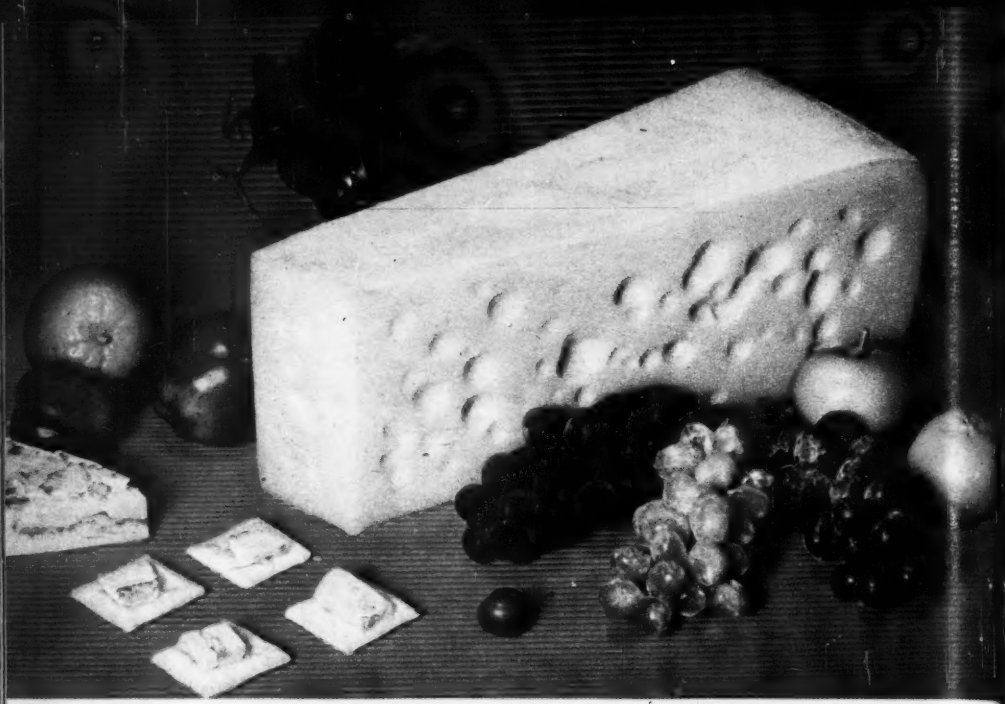
But nobody gets hurt in those Hollywood crackups. And that new car is still beautiful enough to be brushed off and smashed up another half dozen times. Where stunt men once thrilled you, a special-effects director now does the job quietly and safely in miniature, then has the terrifying screeching and shattering dubbed in by the sound department.

To stage a wreck for the camera, Howard Lydecker, a special-effects expert, first has the car built on a scale of two inches to the foot. Ten days of careful designing, building, and painting produce a realistic model with glass in the windows and a tiny license on the rear.

Lydecker's brother, Ted, builds the scene. Dirt and rocks are placed realistically over wire and plaster, then a stretch of highway is modeled.

For fire and explosion, a packet of flash-powder is mounted in the car under a gasoline-filled toy balloon. You'll be properly horrified at the screen when remote electrical control explodes that little balloon. As you see that smashup with the camera's eye and hear the sound blast, it's hard to believe nobody actually gets hurt in all that excitement. •

Fire is doused before it can damage the model. The car crashed and burned eight times for this scene.



Food—Not To Be Eaten

FEAST your eyes on that gorgeous display of sharp, tongue-teasing cheese; smack your lips at the lush ripe fruit, the mellow-spiced hot ham. Melt your mouth with a long look, but don't try a quick bite—you'll crack your teeth!

The beauty in this banquet is only paint-deep. It's all art for the eye—not food for eating. But that art saves real food from waste in those elaborate dinners on stage and screen and in fancy displays.

Twenty-one years ago Mary Inman, a thrifty bookkeeper in Brooklyn, was shocked by the spoilage she saw in a display of real food. She had studied sculpture and had a flair for both color and cooking. She cooked up succulent dishes and experimented with food forms in plaster, paraffin and cement. By artful touches of paint and varnish she learned to make fake food look real.

Today Miss Inman employs six artists to help her meet the orders from merchants, advertisers and theater and motion-picture producers. Like a good housewife, she usually begins her day at the

Like to eat meat? That big juicy chunk of steak looks too good to be true these days. It isn't.

Garden-fresh vegetables garnishing that succulent Virginia ham—would the real thing look so tasty?

stove. The "breakfast" she prepares, however, may include a fragrant ham, luscious pressure-cooked vegetables or a golden-crusted roast. The imitations then are molded with such painstaking care for detail that one item may take six months to get its startlingly real look. •

Looking at this painted pastry will make your sweet tooth ache. At left, Miss Inman uses real cooked roast for her mold.

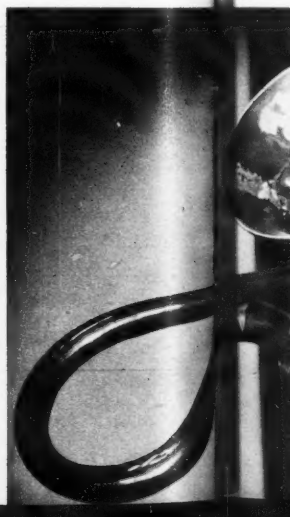
Sweet enough to eat? That's the way this Spanish "snake" behaves about master's music.

Ancient Wind Instruments

HISTORY of the horn is almost as ancient as the history of man. First wind instrument probably was a spiral shell picked up by early man in his search for food along the shore. The Greeks had a myth for it—demigod Triton blowing on a conch shell as a trumpet to whip up or calm the waves.

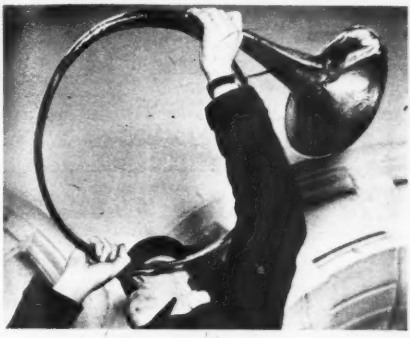
Besides shells, men also have used animal horns and even hollowed tusks for calls to war and the hunt or for monotoned ceremonies. Wood, then metal, instruments evolved from the single-toned horn, with lip and reed pipes and keyed stops to permit such fancy music as the boys are blowing on these pages. Pictures show some of the instruments developed since 1600 and now displayed at a London Museum. Last wind instrument will be horn Gabriel will blow Judgment Day. •

Old Russian bassoon, made in France about 1830, looks ready to bite out new note.



No high-hat music here. Baby bugle piped the tune when British bike club spun for sport in '90s.

Thirteen-key "serpent" must have sounded a sour note for unlucky London lads in 1848. Below, music goes 'round and 'round in oldtime French cornet.



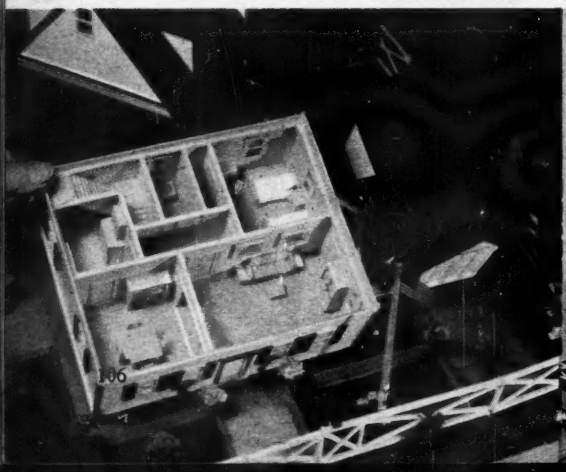
Hitting a high note, museum aide shows how 18th century hunting horn (above) called French nobles to the chase. Copper bass horn (below) booped a big note in London band over a century ago.

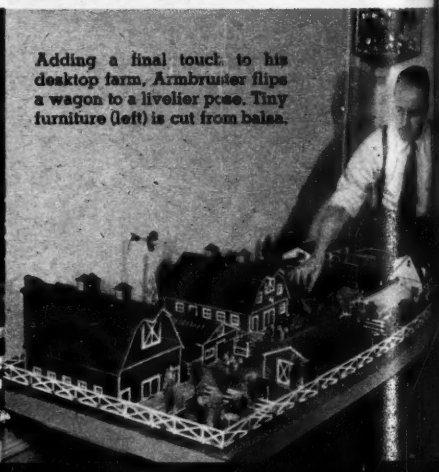
Scale-Model Farm

LEOPOLD ARMBRUSTER, recovering from a leg ailment, found he was a top-flight miniaturist.

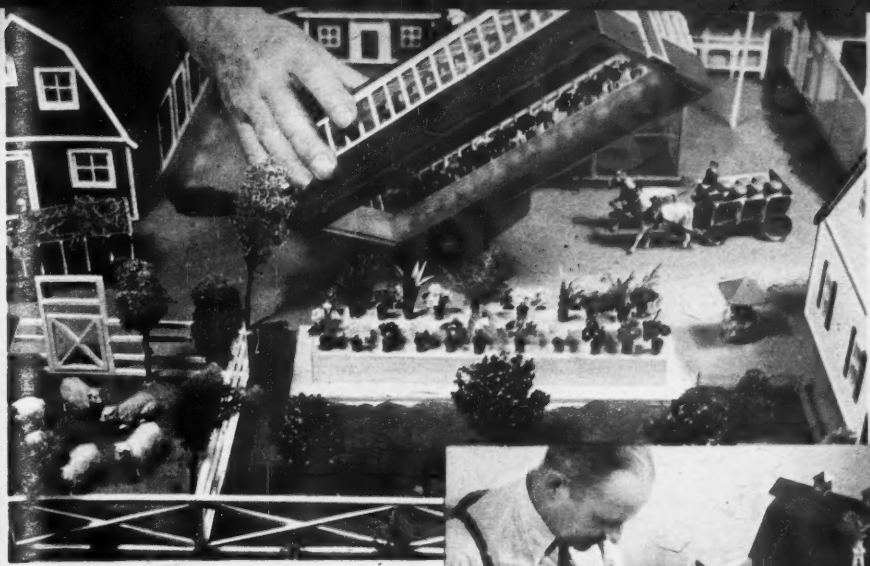
He laid a board on his lap (for a bench) and started whittling out a farm building. His fingers flew. His farm grew. In six months it was a vast table-top establishment complete with eight buildings, cows, horses, sheep, hogs, rabbits, chickens, pigeons, people and wagons—all boiled down to a scale of ¼ in. to 1 ft.—a masterpiece of fine detail.

His buildings come apart and are fully equipped with rooms, furniture, stalls, chutes, etc. Animals and men are molded of clay. •





Adding a final touch to his desktop farm, Armbruster flips a wagon to a livelier pose. Tiny furniture (left) is cut from balsa.

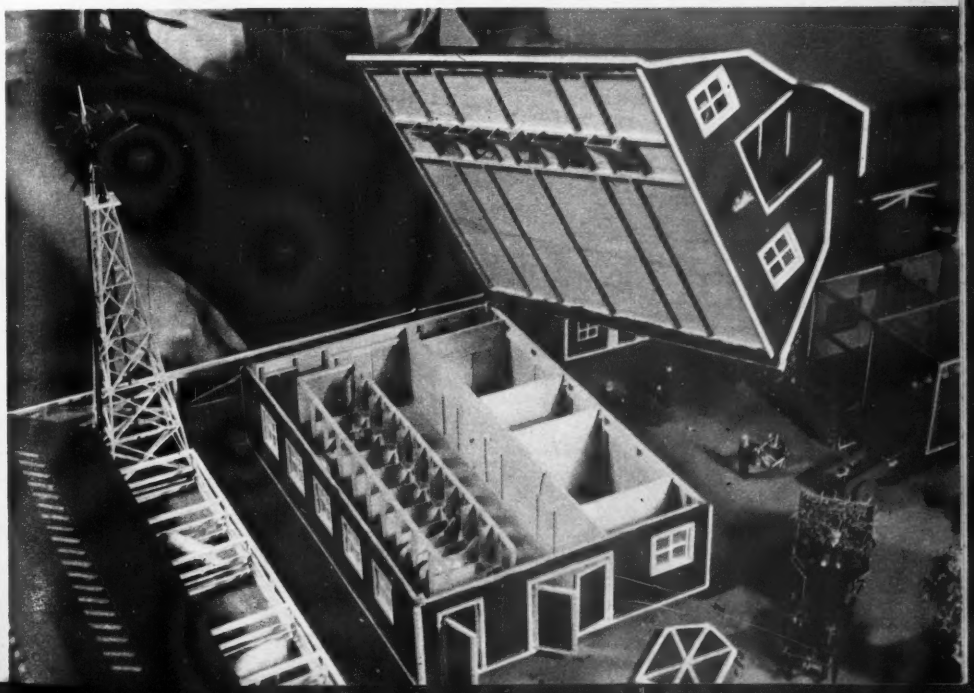


Photos by Louis Hochman

The greenhouse lifts away from its flower-decked base. Note the well, the wagon, the high-pole birdhouse.

Armbruster at work on roof of hog-house, foreground. Cattle in stalls belong in barn with silo, behind.

Lifting away hayloft, one sees feed chutes which allow hay to be dropped to horse stalls on the floor below.



THE BASEBALL— A Precision Product

IF YOU'RE a big league slugger and "hot," you may loop that baseball against the stands, burn it over third base or sock it out of the park. But hot or cold, you still won't "knock the cover off."

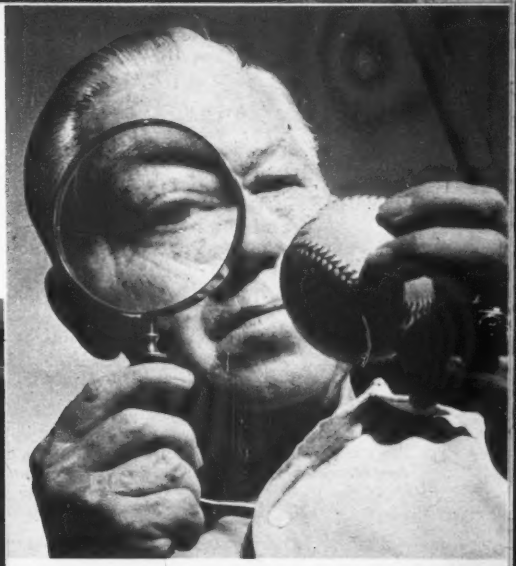
For the baseball is a precision product, solidly designed by fine workmanship to take the hardest swat. The official baseball's core is made of topgrade cork and rubber carefully cushioned in three windings of wool and a binding of cotton. But the greatest care goes into the ball's precise wrapping-up. Two hourglass-shaped pieces of finest horsehide must match in thickness to 55/1000ths of an inch. Each

Warren Spahn, Braves' ace, gets set to scorch the plate. Below, the inside story on what the ball makers pack into such a pitch: Top row—uncovered ball, covering materials, American, National League balls (they're the same); bottom—cork, rubber for core, winding yarns, cotton pad.

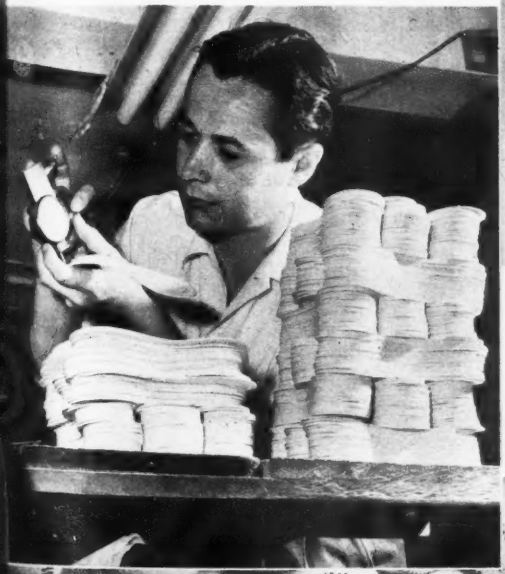
Three stages in sewing: (1) stapled ball (right), (2) needlework in holder and (3) finished product.

ball must get exactly 108 hand stitches.

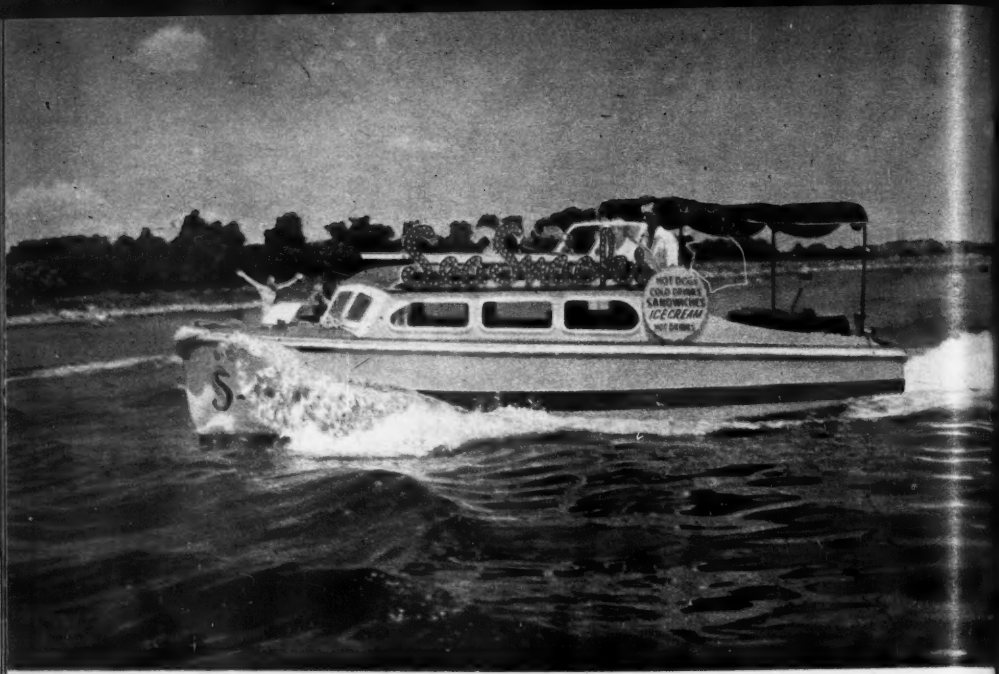
Edward Hubbert has put Perkasie, Pa., in every big ball game. Thirty years ago he moved to Perkasie and began covering baseballs in his kitchen. Today 200 of the town's 4,100 people help him "cover" baseball so precisely that even a Ted Williams can't wallop "the Perkasie" off that pill. •



Keeping a close eye on the ball, Hubbert sees that his factory's work is flawless.



Elwood Strohm, foreman, checks hide covers; they must be exactly .055 of an inch thick.



Sea-Going Diner Pays No Taxes

BY TOM McCAHILL

SAILORMEN of New York waters don't die of thirst any more, thanks to a new enterprise that pays no rent and no local taxes.

No, sir. When they're a little parched they twist an ear until they pick up a few musical horn-toots. Then they jump up and wave their arms. A slick cruiser draws alongside. "What'll you have?" asks a smiling cookie.

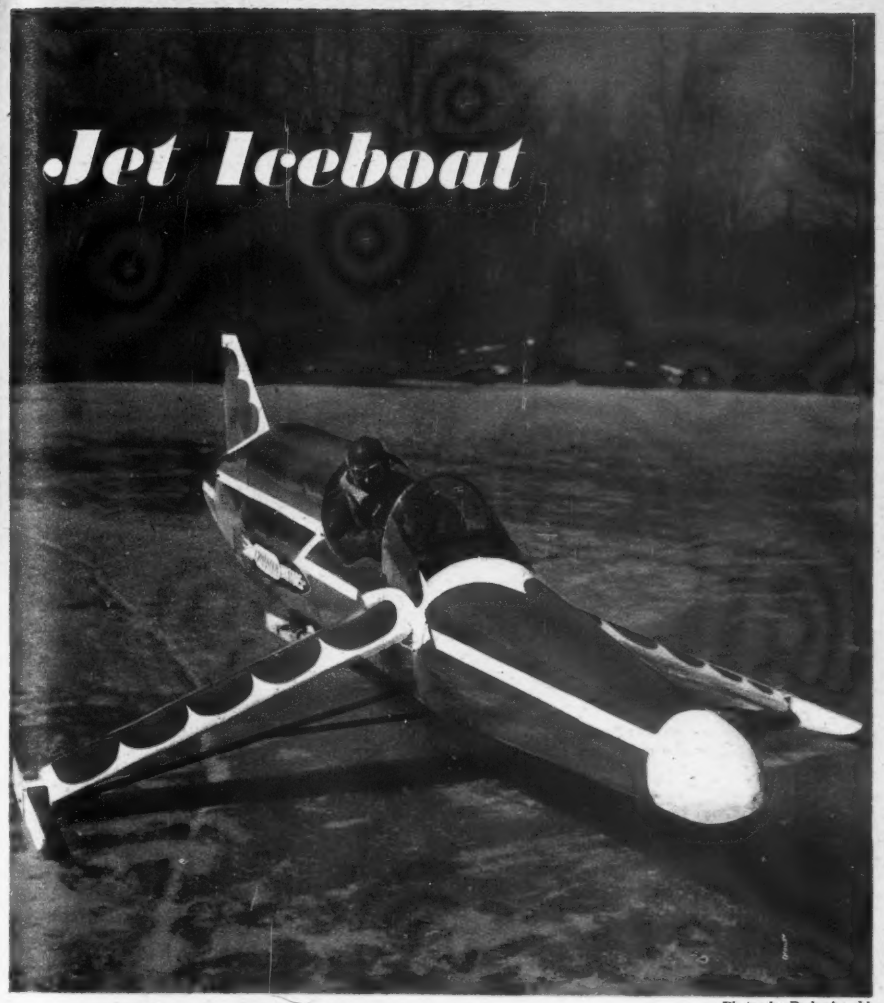
They have soft drinks and coffee and ice cream and hot dogs—great quantities.

Last year one enterprising "dog" dealer launched six 20-footers and did a rushing business. You might look over that little lake nearby; it may have possibilities this summer when the fishermen and bathers are numerous. But your floating hotdogs stand will pay taxes on local waters. •

She's a cruising oasis. She's fast, she covers a dozen harbors, she refuels many a dry fisherman.

Drive-in service becomes float-alongside service. Customers arrive both above the water and in it.

Jet Iceboat



Photos by Rudy Arnold

ROCKET specialists have developed what is probably the first piloted rocket-powered iceboat ever to undergo successful tests.

It resulted from a unique spare-time project carried out by Test Department personnel at Reaction Motors, Inc., Dover, New Jersey.

With an eye on cracking the world's record of about 130 mph for powered iceboats, the men constructed a craft unlike any that has ever existed before.

At a passing glance one would take it for a plane. It has a long, cigar-shaped "fuselage," with an up-jutting tail-fin and open pilot's cockpit placed halfway back behind an extended nose. Long outriggers—in the same quick passing glance—look like wings, except that their dihedral angle is slightly negative—that is, they slope downward a little from the body.

All major parts of the boat, including its rocket engine, were constructed from scrap materials. The "fuselage" and outriggers are of one-inch stainless steel pipe, welded at the joints. One-quarter-inch stainless steel tubing forms the pilot's seat and does all the reinforcing that was necessary.

The overall length of the iceboat is 20 feet. Its shell is covered with sheet metal.

Looks like pilot in open-cockpit plane. Anyone "bailing out" at 200 mph would slide a long way!

Each outrigger is five feet long. The sizeable vertical fin aids in giving stability at high speeds.

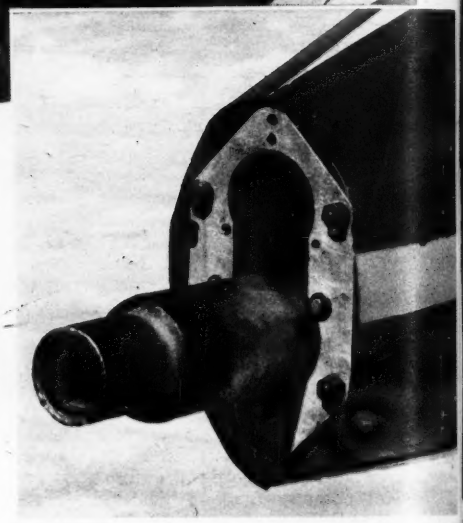
Control is maintained by a wheel in the cockpit which connects by cable to the rear runner. Each of the three runners is three-and-a-half feet long and has a 45-degree blade angle.

Total weight of the craft, including the pilot, reaches 1,600 pounds.

The power plant is a small rocket motor, ten inches long and two-and-one-half inches in diameter, developing 400 pounds of thrust. Alcohol and liquid oxygen serve as propellants.

The tanks containing the propellants are placed behind the cockpit, and a nitrogen bottle for pressurizing them is located in the boat's nose. Sufficient propellant is carried to permit motor operation for about three minutes.

The boat was tested at Lake Hopatcong, New Jersey. Rough ice and drifted snow prevented the test operator from keeping the rocket motor in operation for runs longer than 18 seconds—but, even so, a speed of 95 mph was recorded on the air-speed indicator. Inclement weather and poor ice conditions prevented a run to attempt to break the world's record.



The jet-craft's business end. Out of that little motor may come the power for a new record.

The craft was designed to reach a speed of 200 mph. It is quite possible that with some redesigning, speeds well over that figure can be realized in a long run on smooth ice. •

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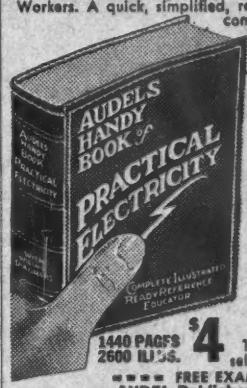

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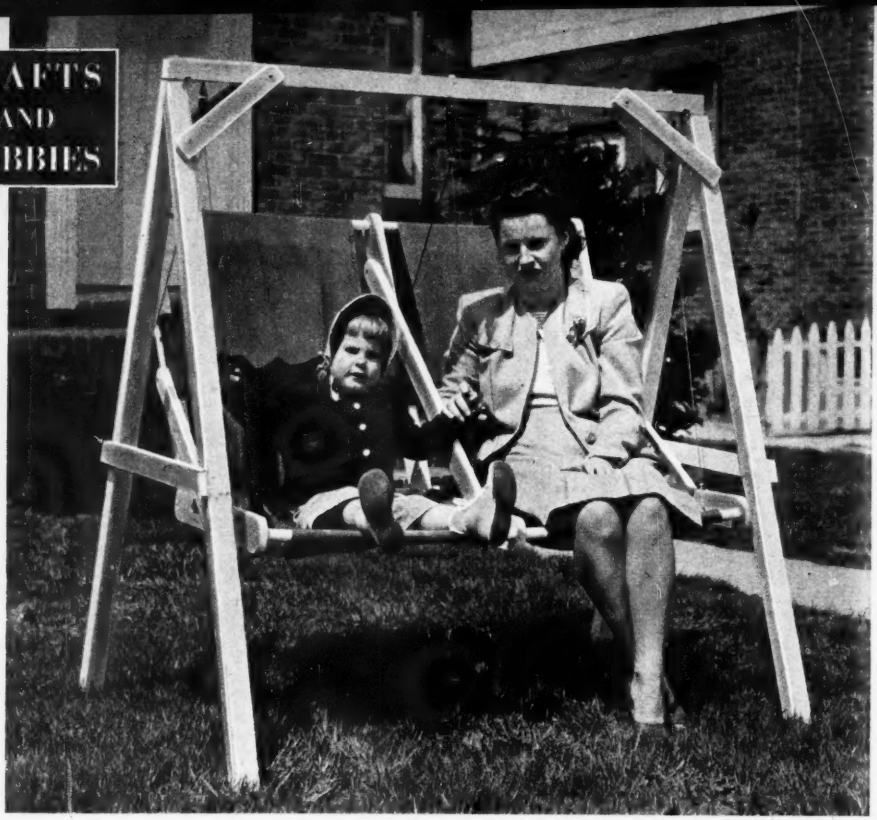


MI Staff Photos

Two-Seater Garden Swing

BY WILLIAM J. KOERBER

"THE swingingest, bouncingest, floatingest ride I ever had." And you, too, will say the same after your first few moments in this garden swing. Practically all of the sitters' weight is taken up by three springs. This results in an extremely airy ride for the occupants.

Begin by constructing the supporting frame. The two A's and the crossbeam are made of 2x3 in. fir. Each A is joined at the end as indicated in the drawing with a ½ in. dowel and two screws. Brace them at the half-way mark with a piece of 1x2 in. pine. The upper crossbeam is secured to the top of the A's with angle irons or with hinges, if you prefer, for ease in storing.

The construction of the double seat is fairly simple. Follow the dimensions in the drawing carefully in order to assure a comfortable seat. Cut the six main pieces and drill holes through them to fit ¾ in. dowels; hardwood broomstick handles are excellent for this purpose. Slide them in place and fasten them in position with nails and glue. Wrap the canvas around the dowels and tack them in place. Leave a little slack at the bottom of the seat.

Drill three holes in the upper crossbeam to take three eyebolts. The coil springs which support the seat are fastened to these eyebolts. After the seat has been mounted, you are ready to adjust the pitch of the seat and take your initial test flight. This adjustment is obtained by securing a clamp around the two arms of each length of chain used to support the seat.

The supporting springs should be heavy enough so that they will not stretch more than half their contracted length when two adults are seated in the swing.

Finish the swing by painting all the vertical members dark green and all the horizontal pieces light yellow. Seats should be taken indoors during inclement weather. •

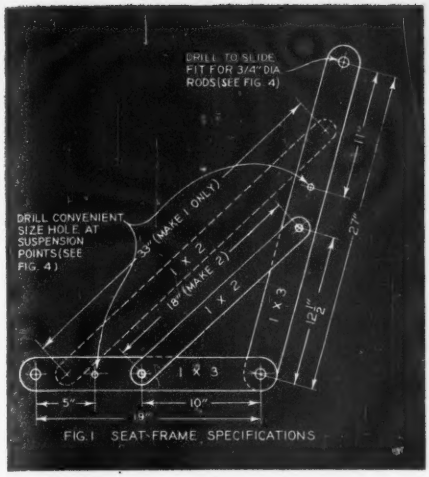
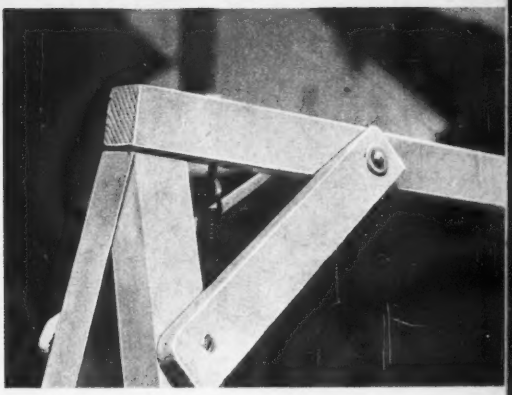


FIG. 1 SEAT-FRAME SPECIFICATIONS

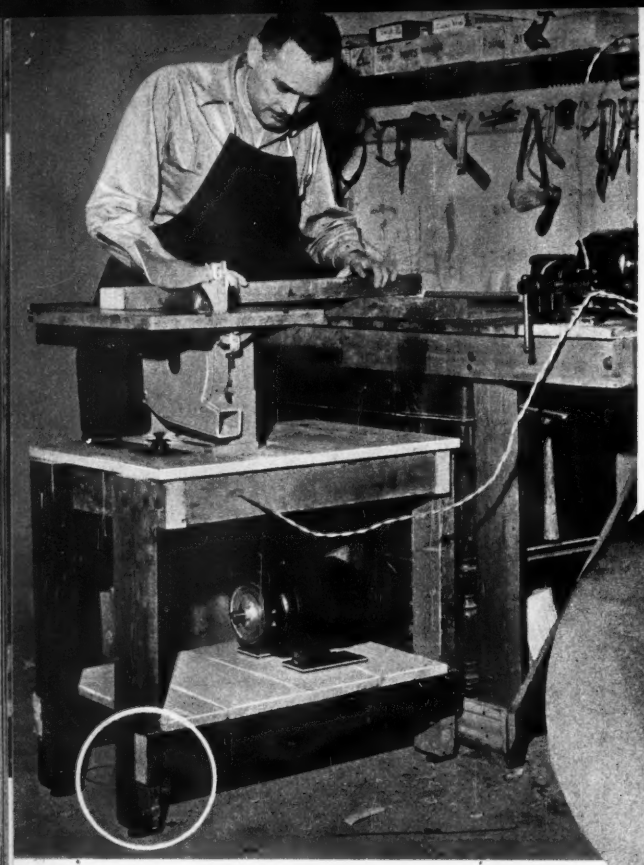


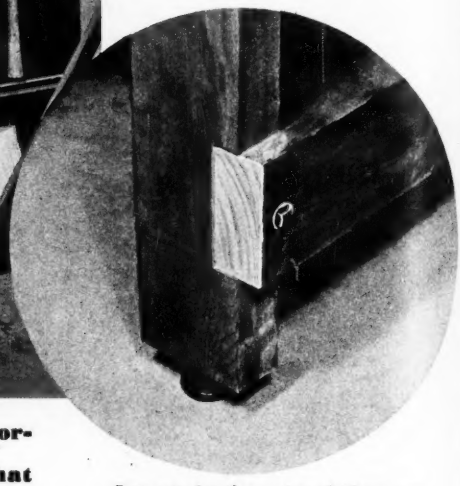
A close-up of the upper portion of the swing showing the cross brace and the spring. Note how the spring is suspended from the eyebolt.

FIG. 4 – ASSEMBLY DRAWING AND MISCELLANEOUS CONSTR'N. DETAILS

Sturdy Saw Table

BY ROBERT BRIGHTMAN





A support for your power saw that incorporates a unique safety switch that absolutely prevents accidental starting.

Supports for the motor platform are half-lapped into legs. Note casters.

NOW that you have purchased your bench saw, the next thing required is something on which to mount it. Of course, you can go ahead and get a store-bought stand but if you are a real dyed-in-the-wool craftsman, you will make one, using the saw itself for its first big job in its new home.

In constructing this saw table, the saw and motor were temporarily mounted on an old dining room table. This set-up sufficed to cut the required legs and planking. Then it was removed and mounted permanently as shown in the photograph at the top of the page.

An important feature is the safety switch set into the table. Having an inquisitive youngster of five who is always on hand when any work is being done, some positive means was required of making the saw inoperative when it was left unattended. This was accomplished by wiring an extra receptacle in series with the power line. As can be seen from the diagram, power will flow to the motor when the toggle switch is thrown and *only* when the safety plug is inserted. This safety plug has an internal short and thus completes the circuit. Whenever the saw is left unattended the plug is pocketed. As an added precaution, the power line is removed. However, small boys can insert power lines and flip toggle switches, hence the safety plug.

The table itself was constructed of 2x4's and 1 in. planking. The planking for the motor rests on two 2x4's. Four 3/8x4 in. carriage bolts secure the legs to the upper framework of the table. The framework itself is butted together and fastened

with $\frac{5}{16}$x4 in. lag screws and washers. The 2x4 motor platform supports are half-lapped into four legs and similarly fastened with ¼x3½ in. lag screws and washers.

A refinement is the four adjustable casters inserted in the bottom of each leg. This is a "must," especially if your cellar floor, like mine, is the least bit uneven.

In constructing this table, the height between the motor platform and the upper platform is, of course, governed by the pulley height of the motor. However, the upper platform should be carefully determined so that the height of the saw table is the same height as the height of your workbench. If you follow this scheme, you will find that you will be able to support long lengths of work on your workbench while cutting them on the saw.

The line cord for the motor, which should be heavy enough to deliver current without a drop in voltage, is snubbed in back of the upper framework by means of a knot. •

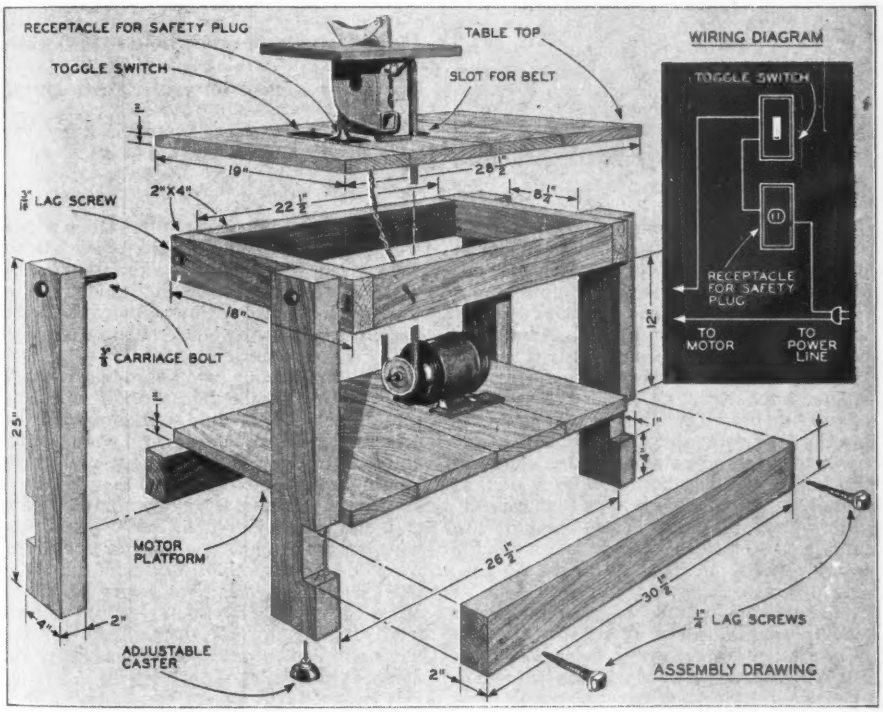
Motor can be started only after shorted plug has been inserted.

BILL OF MATERIALS

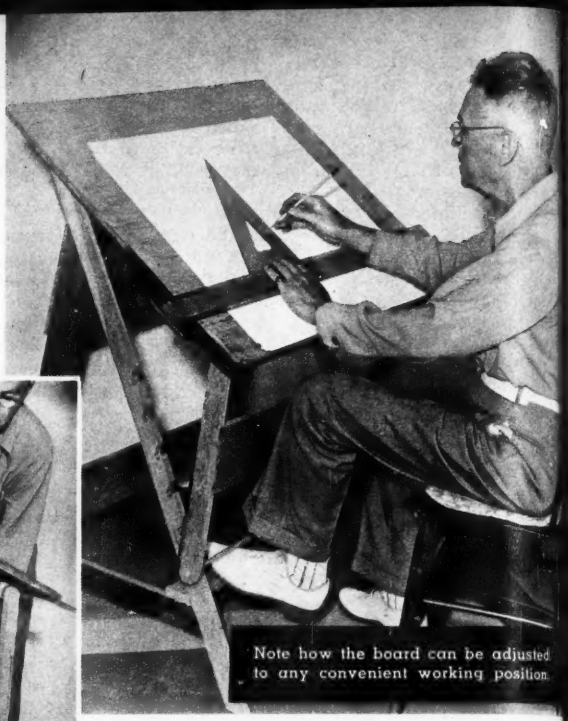
Table Top	1x19x28½ in.
Motor Platform	1x18¼x26½ in.
Legs (4)	2x4x25 in.
Upper Framework (2)	2x4x18 in.
Upper Framework (2)	2x4x22½ in.
Lower Stretchers (2)	2x4x30½ in.
Carriage bolts (4)	⅜x4 in.
Lag screws (4)	5/16x4 in.
Lag screws (4)	¼x3½ in.

MISCELLANEOUS

12 washers; 32 flathead screws, 3½ in. long 1 toggle switch; 1 receptacle; 1 safety plug; 2 cover plates; cord and plug.



Adjustable DRAFTING TABLE



Note how the board can be adjusted to any convenient working position.

Make this professional-looking table for the design corner in your shop.

BY EDWARD R. LUCAS

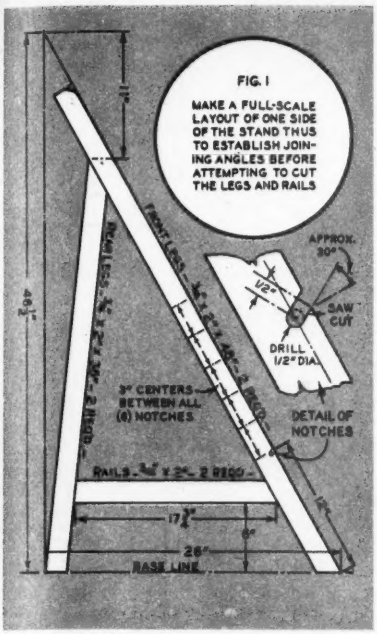
IF YOU'RE a craftsman who likes to see what a project looks like on paper before you build it, this inexpensive, adjustable drafting table is for you.

The angle of the front and back legs for the stand, Fig. 1, is not critical. Assembled as shown, the top of the front legs will be approximately 41 in. from the floor. It's a good idea to make a full-scale layout of one side before cutting the joining angles for the legs and rails. The notches in the front legs for adjustment of the angle of the board are first bored; then sawed, as detailed. Assemble the legs and rails by gluing and doweling. When the glue has set, nail the three bracing boards to the framework, as in Fig. 2, to give rigidity. The upper back brace, which is made of ¼-in. plywood, should have ample width to eliminate lateral sway.

The upper framework is assembled as in Fig. 2. The main considerations here are to make certain that the upper rails give sufficient support to the board and that the front rails will clear the outer sides of the front legs when assembled to the stand. Two spacer blocks glued to the upper rails will insure this. Attach the upper rails to the drawing board with wood screws. Don't use glue here, as the board must be allowed to "breathe" a little.

If you make your own board, a soft wood such as pine should be used. It will take thumb tacks better than will hardwood. In making the board, take several wide boards and cut them to length; then saw them lengthwise into strips about 4 in. wide, turn alternating strips upside down and end for end, and glue together in that order. This will neutralize the tendency of the wood to warp in one direction, thus maintaining a level surface. Also, set a strip of ¼-in. plywood into each end, as noted, before finally truing up the edges. Over-all dimensions can, of course, be scaled up or down as desired.

It is best to leave the board unfinished, although if you find this objectionable you



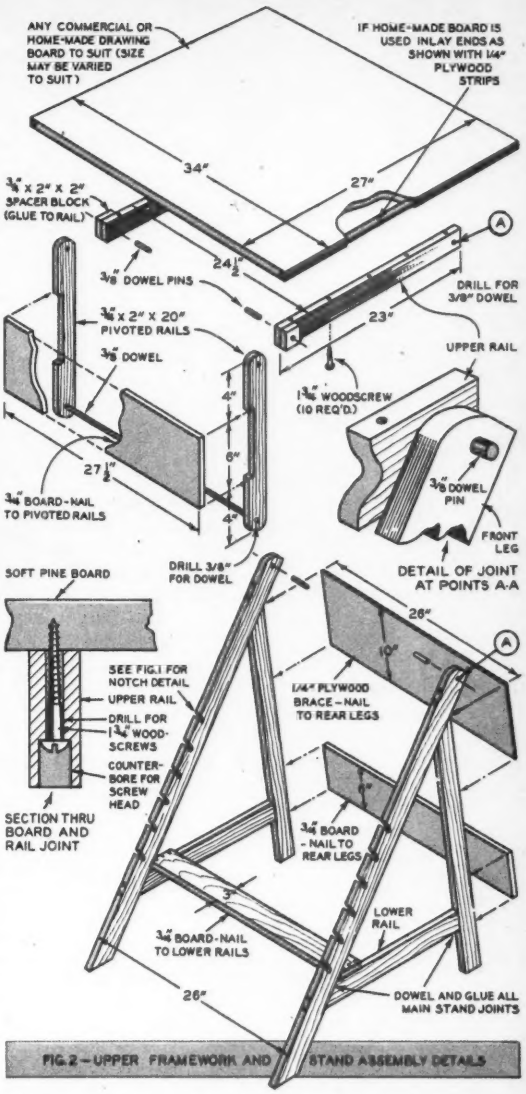
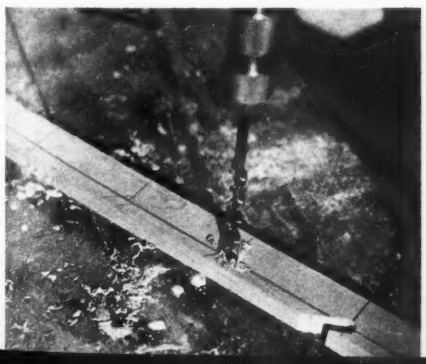


FIG. 2 — UPPER FRAMEWORK AND STAND ASSEMBLY DETAILS

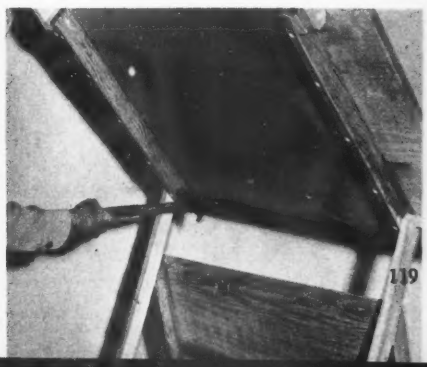
can apply one or two thin coats of shellac or varnish to the surface. The upper framework and stand may be finished in any manner desired. They will look good with a natural finish, or stained, or even enameled.

To complete your drafting outfit, add a comfortable straight chair, a T-square, a 30-60° triangle, a 45° triangle, a medium-hard pencil, an eraser, an inexpensive pair of compasses, a scale rule, and a supply of white drawing paper. If you desire to have blueprints made of your drawings, substitute tracing paper for the latter. If possible, arrange the drafting table so you get natural northwest light over your left shoulder. •

To make the notches in the front legs, bore the holes first; then saw at an angle, as detailed.



Dowels driven through the front legs and upper rails form pivots, making the board adjustable.

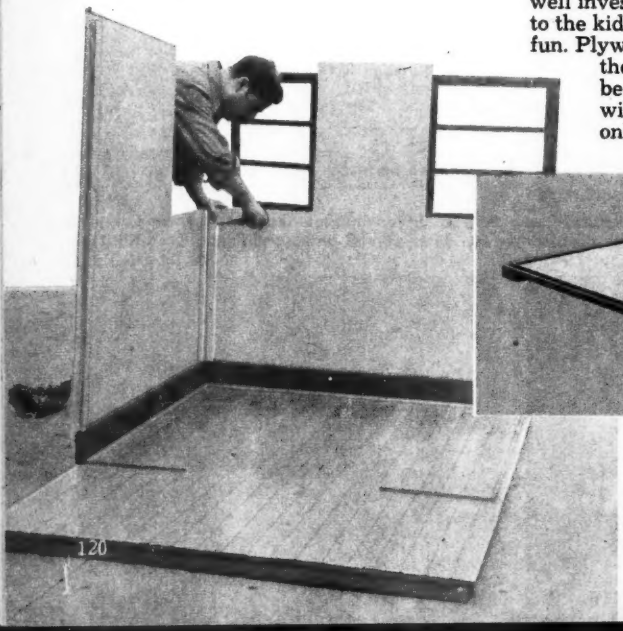


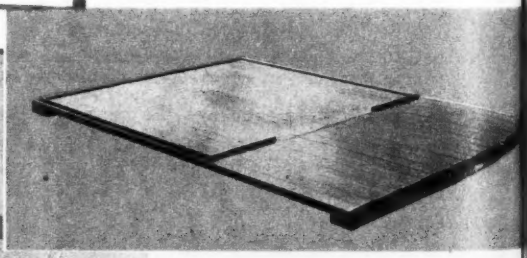
Playhouse for Jack and Jill

A plywood home that is guaranteed to put you in solid with your kids.

BY HARRISON NEUSTADT

THERE is nothing that can take the place of a house of your own. This is true not only among adults but even in young children. So here is a playhouse for them and, although not a one-evening project, the work you put into it will be well invested, bringing countless dividends to the kids in the form of clean, wholesome fun. Plywood in standard sizes is used and the house is so planned that it may be put together or knocked apart at will, using a screwdriver as your only tool.

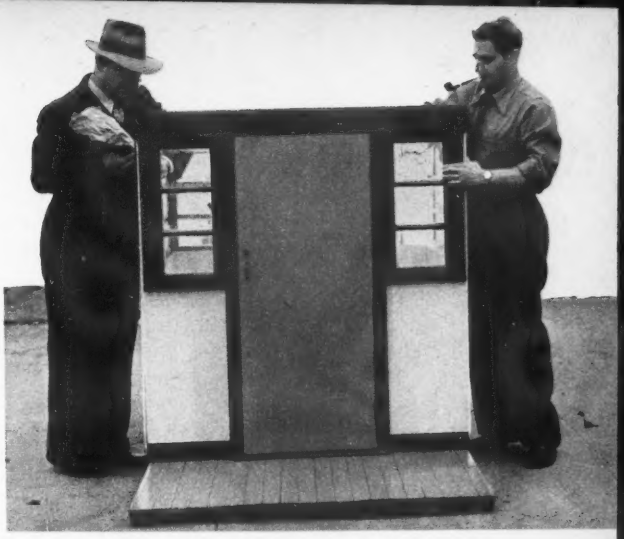




Fasten the quarter-round molding, shown here, to the floor after the house is assembled. It will keep out all bothersome drafts.

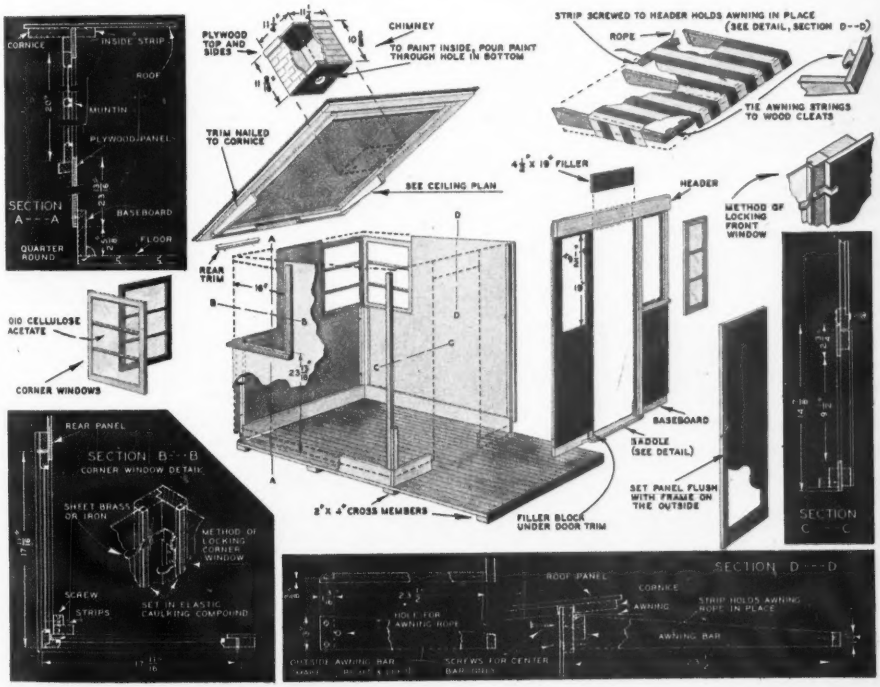
All plywood is ⅜ in. thick and should be waterproof. Coat all joints with waterproof glue. Use 13/16-in. wood for all non-plywood parts. Where brads are called for, use 1-in. No. 16. Before painting, size all surfaces with a thin mixture of waterproof glue; then sand well. Finish with a good quality of house paint. Use deck paint on the porch and roof.

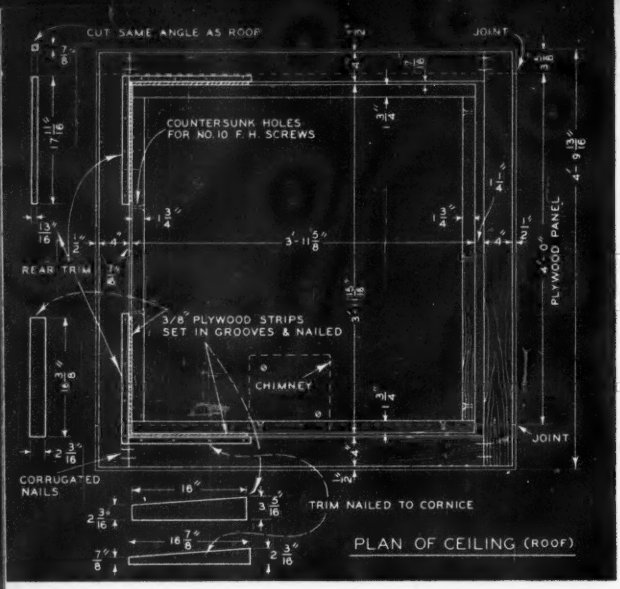
Floor. On 2x4-in. cross members, spaced 24 in. on centers, lay 25/32-in. tongue-and-groove flooring, securing it with 2-in. flooring nails driven through the tongues. The overall dimensions of the floor are 4x6 ft. You can substitute ⅜-in. waterproof plywood for the tongue-and-groove flooring if you so desire. Apply a coat of oil paint to the bottom side after assembly.



When assembling the house, it is helpful, but not absolutely necessary, to have someone hold the panels while you screw.

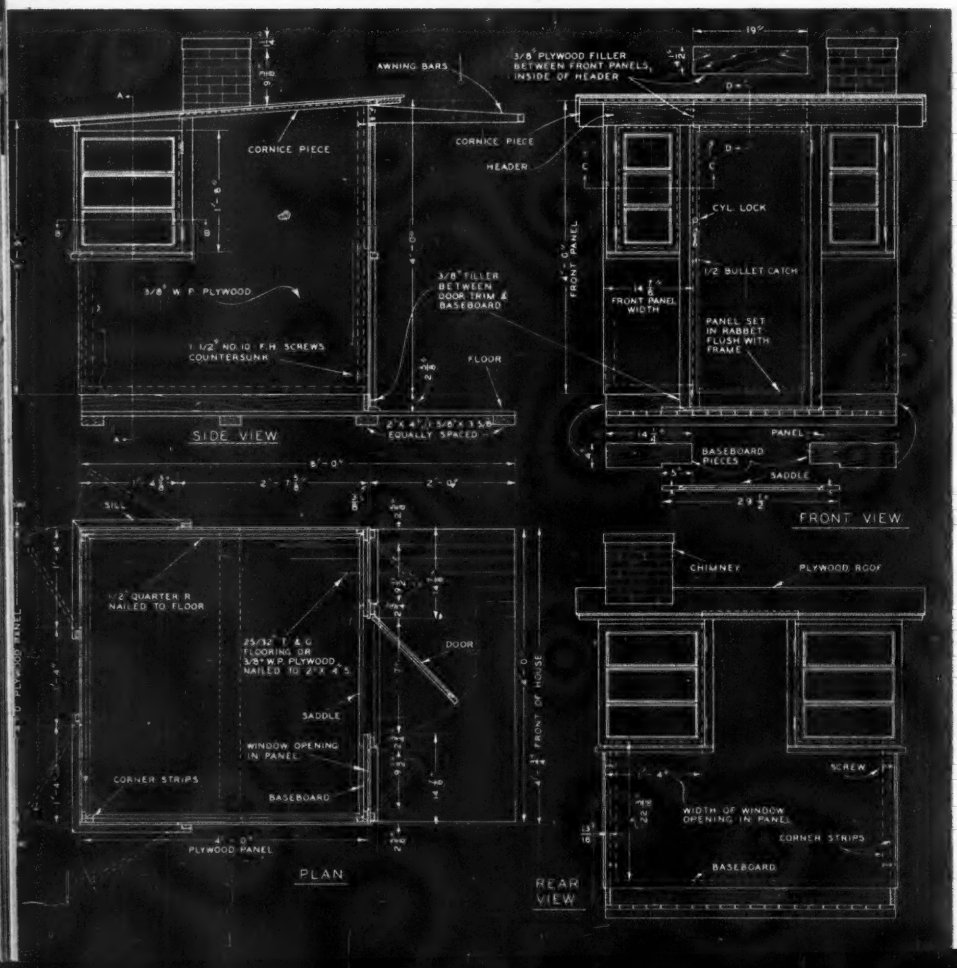
Front. Make the ⅝x3½x29½-in saddle first. Screw this to the two $\frac{13}{16}$x4x14¼-in. baseboards, which are notched to receive it. The two plywood panels are 14⅞x48 in. and have 9½x19-in. cutouts for windows. These cutouts are started by drilling 1-in. holes at the corners and finished with a saber saw. Set them flush with the top and ends of the $\frac{13}{16}$x4x48¾-in. header. Fill in the space between the panels at the header with a 4½x19-in. plywood panel. Make sure that the header is on the exterior and





the baseboards on the interior of the panels; then fasten the assembly together with brads. Apply the $\frac{13}{16}$x1¾x45¾-in. corner strips ⅜ in. in from the panel edges. Add the window sills, the beveled-bottom window trim, and the 1¾x46-in. door trim.

Sides. Lay out and cut the roof pitch and the window opening on each panel; then nail on the 4x46 $\frac{13}{16}$-in. baseboards, leaving a ⅜-in. overlap at the rear end of each baseboard and remembering that one panel should be righthand and the other lefthand. Nailing from the inside, fasten the window sills and trim in place. Bevel the top end of the trim to meet the slope of the roof.



Rear. Plywood for the rear panel measures 45x48 in. and has two cutouts for the window openings. The baseboard is 46⅜ in. long. Add the window sills and trim.

Roof. Cut two cornice pieces 4x56$\frac{13}{16}$ in. and two 4x45$\frac{5}{16}$ in. Fasten these together with ½x1-in. corrugated nails. Check for squareness; then glue and nail the 48x58 ⅝-in. plywood panel to the cornice. Add the trim strips and inside strips as shown on the detail drawing. In the grooves thus formed, glue and nail plywood strips above where the side and rear windows will come, as shown.

Door. Make the door of rabbeted stiles and rails with a flush plywood panel inserted on the exterior. The stiles and rails can be nailed together, doweled, or mortised and tenoned. Apply lock, outside handle, inside knob, bullet catch, and hinges.

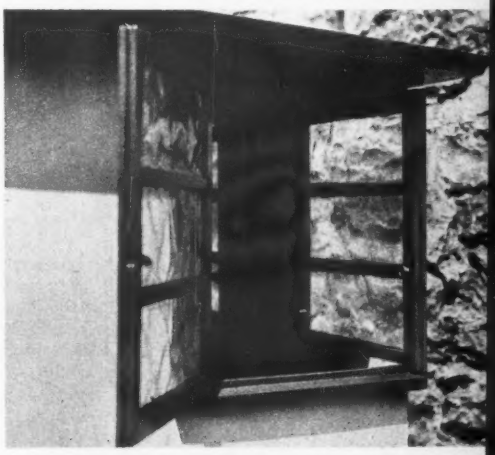
Sash. For safety, don't use glass; get .010-ga. cellulose acetate instead. This is sold in art stores and comes in 20x50-in. sheets. Cut the sheets ⅛ in. short of the rabbet sizes, set them in elastic caulking compound, and nail glazing strips in place. Add the window locks that are shown in the details and hinges.

Chimney. The chimney is simply a box with bricks simulated by 1/32-in. saw kerfs. To prevent warping, paint the inside by pouring old paint into the hole at the bottom.

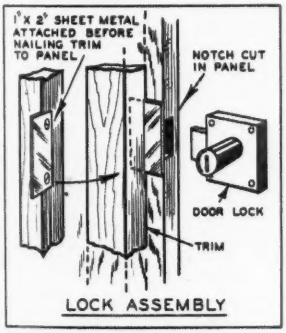
Awning. The awning bars are shown in the detail at the bottom of page 121. Anyone handy with a sewing machine can make the awning from a remnant of awning material. Sailcloth or heavy muslin will do as a substitute if finished with awning paint in a gay color.

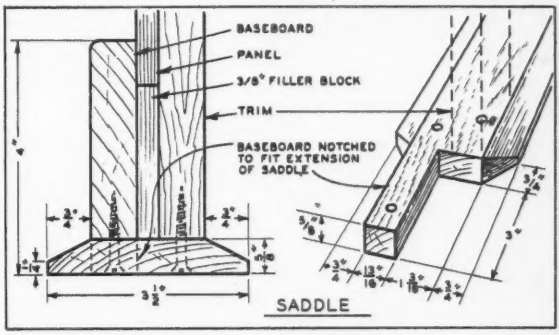
Finish. After sizing, apply two to three coats of house paint in any color desired. The playhouse shown in the photographs has white walls and contrasting door and trim. This scheme may be followed or you can choose your own favorite colors. •

Contemporary in design, the playhouse features a flat roof and modern corner casement windows.



Note that the saddle, below, fits into notches cut in the baseboards to tie the front together.





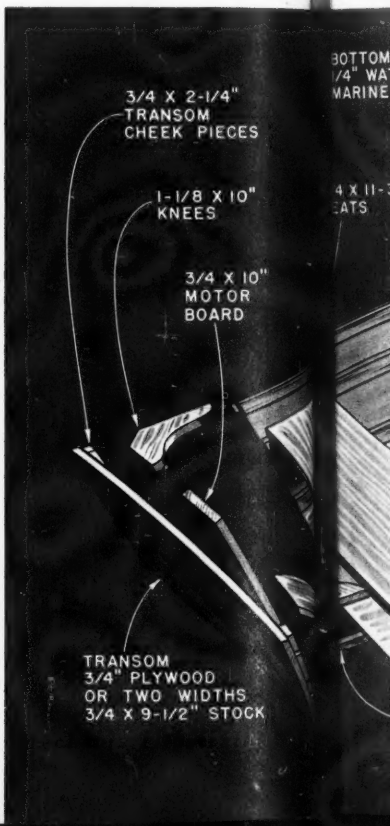
MATEY

An 8-ft. plywood dinghy that's light in weight but built for hard service; ideal as a tender or an all-purpose boat.

A GOOD dinghy is a "must" item as far as the average boat owner is concerned. While it's true that you can pull out to an anchored large boat in almost any old tub, it's a lot less work in a boat that's designed for the job—and such a boat will add to, rather than detract from, the appearance of the larger craft. *Matey* not only fills the bill on both of these counts, but will also tote a surprising payload of passengers and gear. And you won't need any tackle to hoist her up on deck—she's light enough so one man can do the trick. Under way, she'll tow like a little lady at the end of her line. Best of all, you won't have to spend several days getting her in shape at fitting-out time. Because of the plywood planking, her hull is practically leakproof and with ordinary care should stay that way for many seasons. In fact, she's the answer to a boat owner's prayer.

If you're not a big-boat owner as yet, though, you'll still want *Matey* because the construction's a cinch and you can carry her to the nearest lake or river on the roof of your car. Once there, it takes only a minute to put her into the water, and if you own an outboard you can hang it on her transom and take off at good speed for a day's fishing or just plain fun afloat.

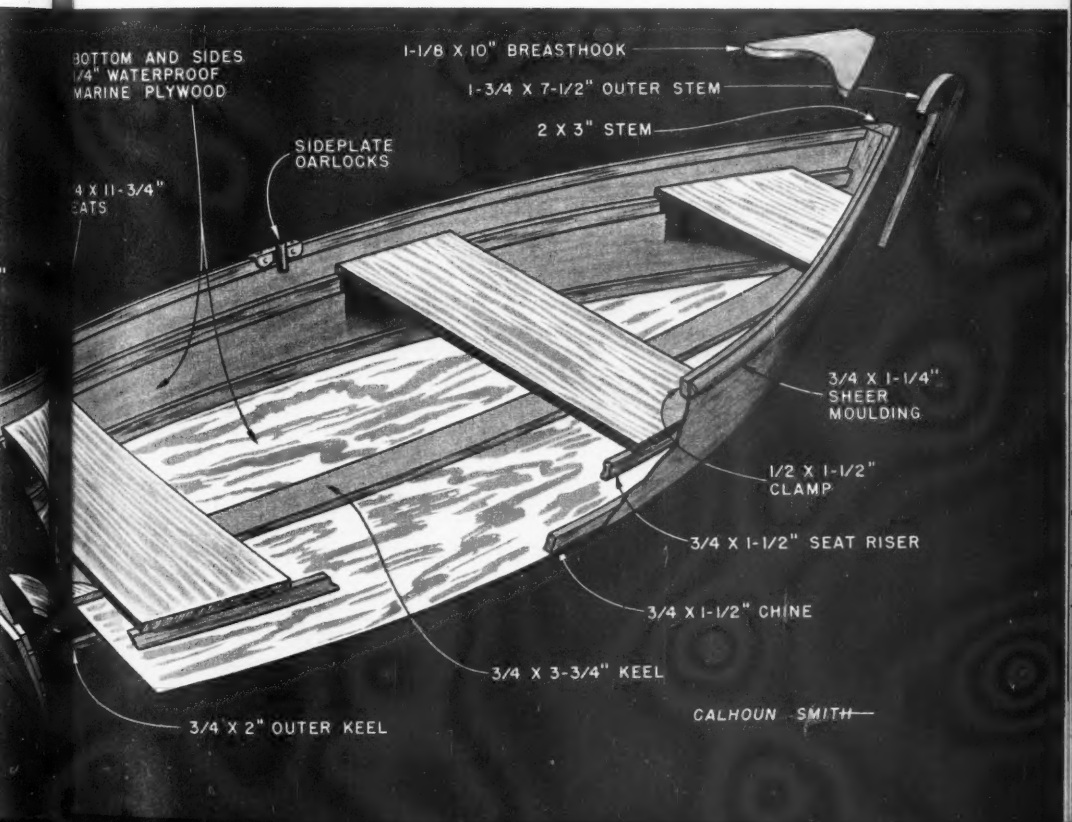
But enough of her praises; let's get down to the construction. The Bill of Materials isn't hard to fill and the total cost shouldn't put too large a dent in even a modest pocketbook. Once you've got all the stock on hand, make the building form shown at the top of page 126. Like most boats of this type, *Matey* is built upside down to make the framing and planking easier. The building form, which you can make of common lumber (it's expendable), should be mounted on legs similar to those of a sawhorse so it's at a convenient working height. Next, make the Mould Frame

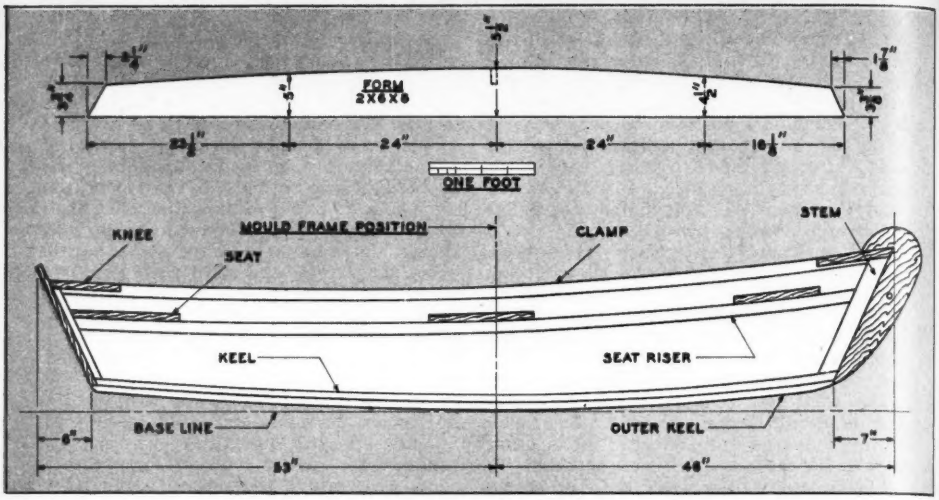


No. 1 from common lumber, following the details in the drawing. You don't have to be too particular in making this mould—it's used just to give the hull its shape during the construction and is discarded later on when the center seat is installed in the boat. After it's made, cut the transom to shape from ¾-in. plywood or two widths of ¾x9½-in. stock that are glued and doweled together. Reinforce it with ¾x2¼-in. cheek pieces, glued and fastened with 1½-in. No. 8 flathead wood screws, and add the motor board; then cut notches in both the transom and the mould frame for clamps, seat risers, chines, and keel. Don't cut these notches through the transom itself, just into the cheek pieces previously mentioned.

The next step is to mount the transom and the mould frame on the building form, cutting a notch for the latter at the location shown. Be sure to brace these members to the form and, if possible, to the floor of the shop with wood strips. When everything is braced and rigid, make and install the stem. Note that it is cut at an angle to fit the front end of the building form, to which it is clamped. Following this, cut the stock for the ¾x3¾-in. inner keel to length and fasten one end of it to the notch cut in the cheek piece of the transom. Use marine glue and two 1¾-in. No. 8 screws to hold it in place. Then trim the other end of the keel to fit the stem and fasten it to this member with glue and the same size screws. The chines and seat risers are now sprung into place and the notches doctored up a bit if necessary so the stringers lie flat in them. Clamp both chines in place at the same time to avoid pulling the hull out of shape; then bevel the forward ends to butt against the stem face. Fasten the chines in place at transom and stem with glue and 1¾-in. No. 8 screws and repeat the process for the seat risers. After this, fasten the clamps in place with glue and one 1½-in. No. 8 screw at each joint. This completes the framing of the boat and at this point you can get some idea of the shape of the hull when it's completed.

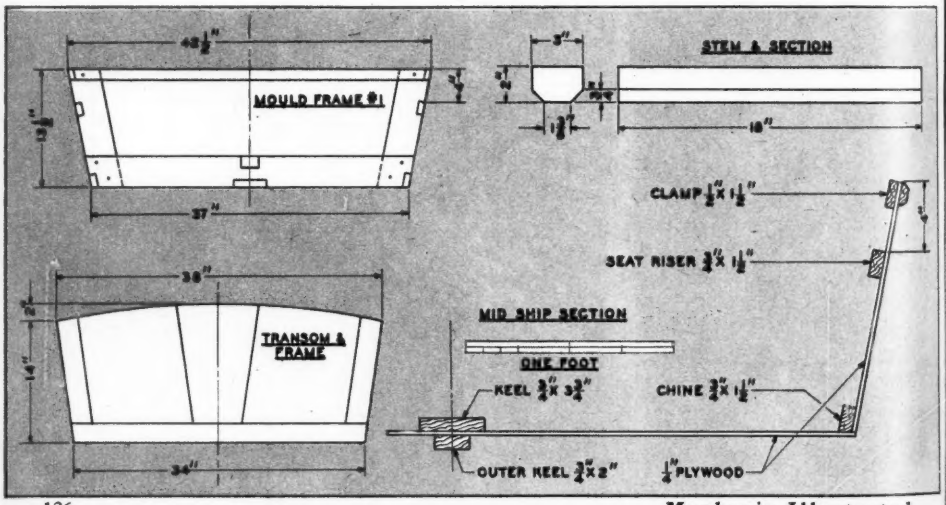
When the glue on the framing has set completely, trim and fair (eliminate flat spots or bumps) the chines, seat risers, clamps, etc., so the plywood sheets of the planking will lie smooth and flat at all points. After this has been done, you can get on with the planking itself. Start with the sides, clamping the plywood in place on the framing and marking the shape that is required. Better make this a bit oversize so you'll have a slight margin for the errors





that sometimes creep in. Then remove the sheet, cut the piece to shape, and try it on the framing for size. If it's satisfactory, give all parts of the framing on which it will bear (the chines, clamps, risers, etc.) a coat of waterproof glue; then clamp the plywood down for keeps. Fasten it in place with 1-in. No. 8 flathead screws, spaced about 2 in. apart. Remove any excess glue from the edges of the planking, using a cloth soaked in gasoline. When the glue on the framing has set, trim the planking at the stem, transom, and sheer, and at the chine so it will butt smoothly against the bottom planking, making a watertight seam.

The bottom planking goes in place next, repeating the process previously outlined for the sides. You'll note that the 6-ft. piece of plywood doesn't cover all of the bottom. The area at the bow end should be planked with waste stock. In gluing the bottom planking in place, coat the keel, chines, stem, and transom with marine glue; then lay thin muslin strips on top and give them a second coat of glue. The plywood is then clamped on and fastened with 1-in. No. 8 flathead screws on 2-in. centers. On the keel, 1¼-in. galvanized shingle nails, clinched on the inside, may be substituted. Where the large sheet of planking butts the smaller forward piece, glue a ¾x4-in. butt block behind the seam and fasten the plywood to it with shingle nails. The ¾x2-in. outside keel can now be fastened in place, using



BILL OF MATERIALS

(Approximate Quantities Required)

Waterproof Marine Plywood

Bottom	1 Pc. 1/4" x 4' x 6'
Sides	1 Pc. 1/4" x 2 1/2' x 9'
Transom	1 Pc. 3/4" x 1 1/2' x 4'

Seasoned White Oak or Straight-Grained Fir

Inner Keel	1 Pc. 3/4" x 3 3/4" x 8'
Outer Keel	1 Pc. 3/4" x 2" x 8'
Chines and Seat Risers	4 Pcs. 3/4" x 1 1/2" x 9'
Clamps	2 Pcs. 1/2" x 1 1/2" x 9'
Sheer Moldings	2 Pcs. 3/4" x 1 1/4" x 9'
Seats	1 Pc. 3/4" x 11 3/4" x 10'
Building Form (May be common lumber)	1 Pc. 1 3/4" x 5 1/2" x 8'
Stem	1 Pc. 2" x 3" x 18"
Breasthook and Transom Knees	1 Pc. 1 1/2" x 10" x 2 1/2'
Shaped Outer Stem	1 Pc. 1 3/4" x 7 1/2" x 20"
Transom Cheek Pieces	1 Pc. 3/4" x 2 1/4" x 6'
Mould Frame No. 1	Made From Common Lumber

Fastenings

3 Gross—1" No. 8 Flathead Bronze Wood Screws; 3 Dozen—1 1/2" No. 8 Flathead Wood Screws; 3 Dozen—1 3/4" No. 8 Flathead Screws; 1/2 pound 1 1/4" Galvanized Shingle Nails.

Miscellaneous

Waterproof Marine Glue; Bronze Side-Plate Oarlocks; Bronze Strap and Ring for mounting on the stem head; 1 Pair of 6-ft. Ash Oars or a pair made from scrap plywood; Plywood Primer such as "Firzite"; Gloss Yacht Enamel; Varnish, etc.

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glue and 1½-in. No. 8 flathead screws.

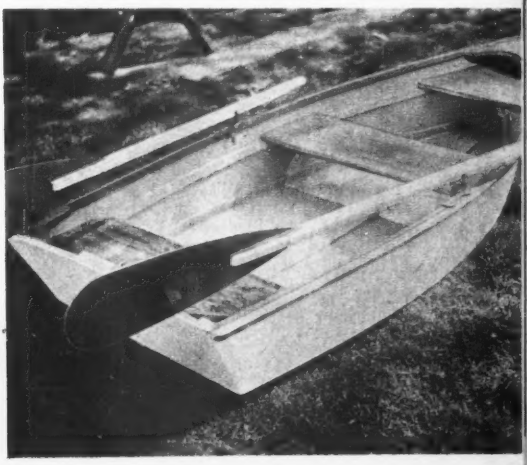
With the hull completely planked, the wooden strips bracing the transom and mould frame to the building form can be knocked off and the boat removed from the form. In doing this, be sure to let the mould frame remain in the hull to strengthen it. After turning the boat rightside up, make and fit the breasthook that ties the clamps and stem together and strengthens the forward part of the boat. In cutting the breasthook, make a cardboard pattern to get the exact shape required. Use glue and 1¾-in. screws to fasten it in place. In the same manner, make patterns for the small quarter knees that go between the clamps and transom and fasten them in place. The outer stem piece, which protects the forward edges of the side planking, should be cut out and fastened in place with glue and 1¾-in. screws. To do this, you'll have to counterbore the holes for the screws and, after they're driven home, drive in wooden plugs.

You can now remove the mould frame and install the seats amidships and at bow and stern. These should be fastened to the risers with glue and 1½-in. No. 8 screws. The sheer moldings go in place next. They are made from ¾x1¼-in. strips beveled on both sides and fastened to the planking and clamp with glue and 1½-in. No. 8 screws, spaced about 8 in. apart. This completes the construction—all that remains is the painting.

The first step in doing this is to give the hull two coats of a good primer to seal the pores in the plywood and form a base for the paint. When the primer is dry, give the bottom of the boat a coat of antifouling green paint and finish the topsides with gloss-white yacht enamel. Paint the moldings in a contrasting color. The inside of the hull can be given a bright finish, using several coats of spar varnish, or painted light green or buff if easy maintenance is desired. For hardware, install a pair of bronze oarlocks and a ring on the stem for the anchorline or towline. A pair of bronze lifting handles, fastened on the transom, will help in getting *Matey* on a car top or a larger boat. The oars shown in the lead photo were made from straight lengths of ash with blades of plywood scraps.

One last word of caution—*Matey* is designed with certain elements of balance, buoyancy, and trim carefully considered; so changing such basic dimensions as the length, breadth, and freeboard, since they will affect these elements, should not be attempted. •

Matey ready to be launched. Breasthook at bow and quarter knees at transom are installed last.



MATEY BLUEPRINTS

Large-scale working prints will help you in building this boat. Send order for plan B-150, price $1.00, and remittance to the MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Conn.

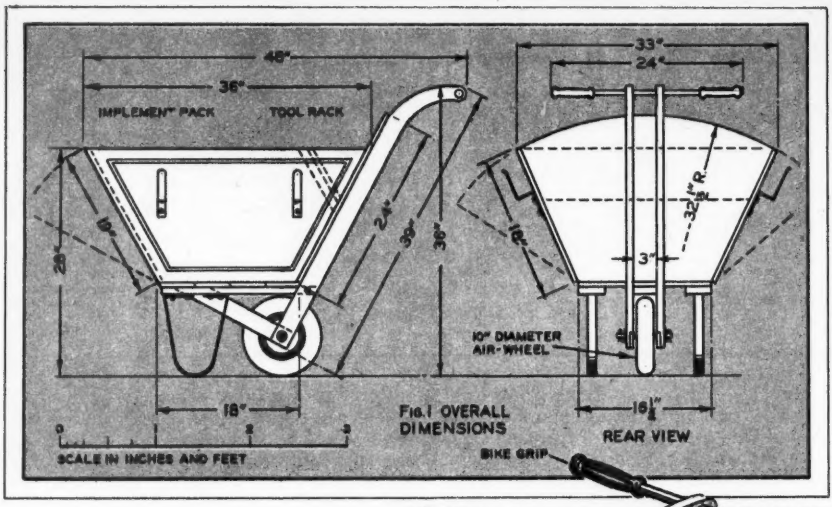


FIG. 1 OVERALL DIMENSIONS

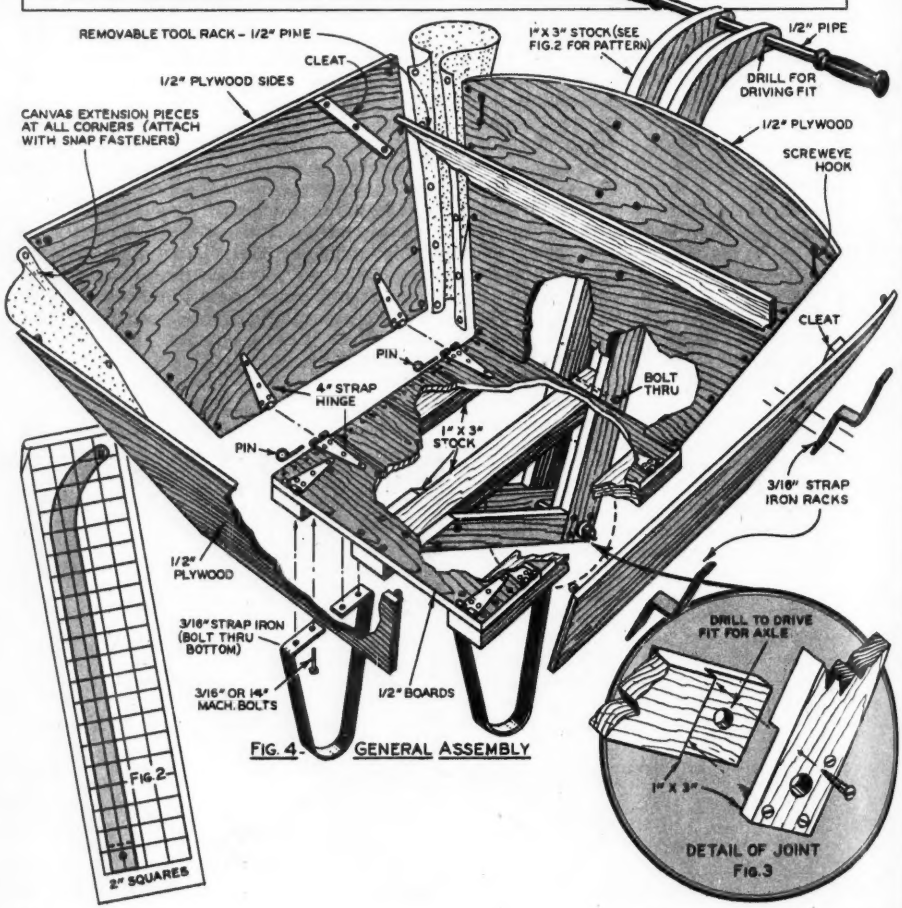


FIG. 4 GENERAL ASSEMBLY

all-purpose GARDEN CART

BY DOUGLAS ROLFE

JUST the thing for spring chores, this simple little garden barrow rides on a single balloon wheel and is easy and inexpensive to build.

The waterproof plywood sides open outwards to make a large capacity leaf cart or they may be completely removed in a matter of seconds to make a sturdy platform truck which is ideal for hauling logs or for wrestling with milk cans.

The accompanying drawings explain the entire construction which calls for no special skill and the simplest of tools. The 4 in. steel strap hinges are used to attach the sides and front, but, before securing these hinges, the regular pins should be removed and replaced with heavy wire draw pins as shown. The four canvas corner gussets should be attached with snap fasteners in order to permit their easy removal.

Any 10 in. balloon wheels may be used. These wheels are back on the market again and are not unduly expensive. They come complete with short axles and will withstand loads of over 200 pounds without injuring the lawn.

The supports on which the wheelbarrow rests when it is not in use are made from two pieces of $\frac{3}{16}$ in. strap iron bent as shown in the drawing. They are secured to the bottom by means of ¼ in. bolts.

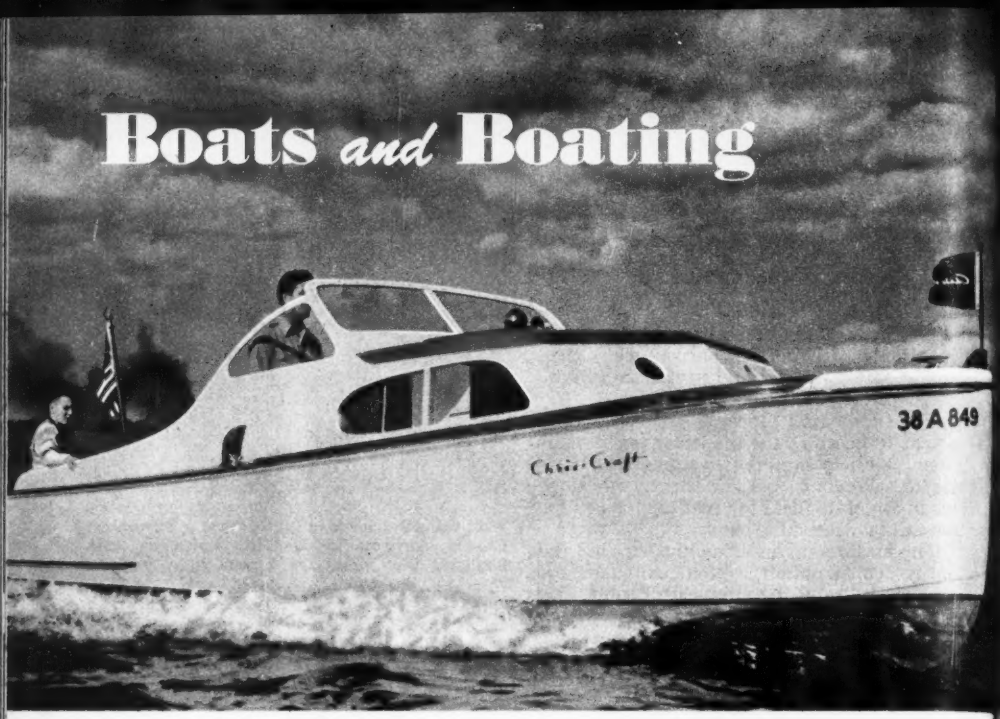
The handle, which has been designed so that it can easily tip the barrow back for rolling, is made out of a length of ½ in. galvanized iron pipe. This pipe passes through the rear curved backbone. The holes for the handle should not be too large; a driving fit is best. Each end of the handle is covered with a bicycle handlebar grip. This adds a very finished appearance to the cart. Do not alter any of the dimensions unduly, otherwise you may shift the center of gravity to such an extent that it will be hard to roll the cart comfortably.

Although plywood sides and front are specified, these pieces may be made from any half-inch stock. Plywood has the advantage of requiring less finishing and is recommended if available. Finish off the cart with several coats of green paint and trim with yellow. •

With the sides buttoned up it makes a convenient one-trip carry-all for garden implements and fertilizer. Waterproof the bottom with asphalt.

The sides and front can be let down to make a spacious leaf cart. The sketch below shows how sides can be removed for carrying bulky logs.

Boats *and* Boating



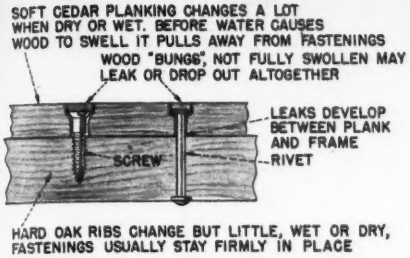
William F. Crosby deals this month with springtime leaks—their causes and a few cures for you to try.

OF COURSE you'll want to go for a sail just as soon as you put the boat over this spring, but it's a risky business —one short sail may take away years of her life. She has been hauled out all winter and has, of course, dried out considerably. Although you have taken care of the seams and other places where leaks might develop, the wood is still dry. It must be given a chance to swell up before you try out that new sail or engine. Perhaps you can get away with a short sail in calm water, but if it starts to kick up a little there is danger that the entire hull may work. If this happens, some of your carefully placed caulking and seam compound may work loose, causing a leak that can last all summer—or perhaps even for the entire life of the boat.

This working of a dry hull in a seaway can also be bad because the fastenings that hold the planking to the framework may loosen up. If the wood is dried out, neither screws, nor nails, nor rivets will be held as tightly as they would ordinarily be. As a result, holes may be forced into oval shapes, which means that even when the wood does swell, the fastenings will be loose. This sort of thing can make annoying leaks that are sometimes hard to locate. The boatbuilders call it "nail sickness," an apt term.

Just to prove the point, not so many years ago a young man raced his sailing keel boat on the day it had been launched. He was in good shape for the first part of the race, but later in the afternoon a strong breeze came up and the boat began to work. As it worked, it started to leak. Before long the leaks were completely out of control. Finally the boat sank in deep water and the skipper was drowned. Had he waited a few days or a week, his boat would have been tight and he would be alive today.

Of course, the safest thing to do to your boat is to run a hose in it for a few days before it is launched. At first the water will probably run out through the seams just about as fast as it comes in, but slowly but surely she will start to swell up. Inside of twenty-four hours she should be fairly tight. The boat doesn't have to be completely filled with water. Even a few bucketsfull in the bilge will cause enough dampness to affect all the seams in the underwater part of the boat. The wood will absorb the moisture even



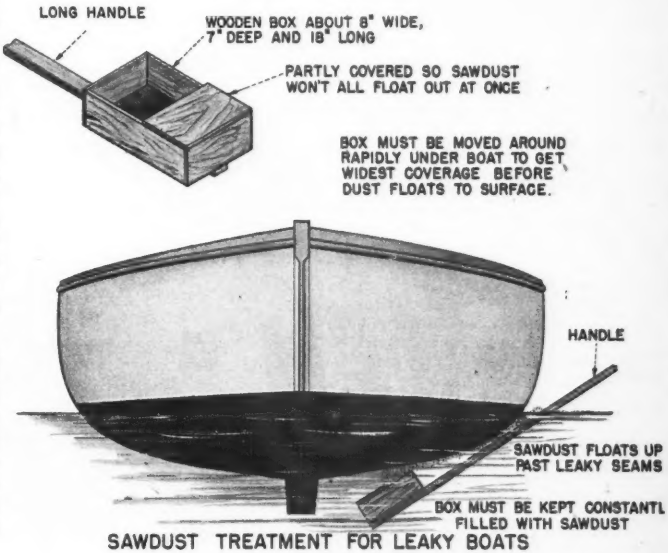
though it is not actually in the bilge-water. By the time you are ready to launch, the chances are that most of your troubles will be over. If she leaks at all, it will be so little that a few strokes on the pump every night for a few evenings will probably keep her fairly dry. Even though you do this, the boat should not be sailed for a few days after launching, thus giving everything a chance to swell back to its normal size and shape.

A lot of men each year do a careful paint-and-varnish job, spending weeks at it. Then, when the boat is launched, the first thing she does is fill half full of water, ruining the new paint job. Many small boats will swamp completely, lying just awash. This, of course, permits all kinds of dirt to get on the new paint job. In some cases, boats allowed to do this have had a nice coating of fuel oil all over the inside when pumped out. This business of permitting the boat to swamp is also bad because usually some of your floor boards float off, not to mention other gear that may be loose. In larger boats, where the weight of the engine or a keel may cause complete sinking, extreme care must be used to see that the boat is reasonably tight before launching, because the complete sinking of such a boat may be costly, doing irreparable damage to the hull and its fittings.

As a general rule, most centerboard sailboats will float even if filled with water and so will many small motorboats, but larger craft, with heavy engines and with plenty of ballast either in the bilge or on the bottom of the keel, may sink like a stone. On the other hand, many small sailboats, if filled flush with water, will turn over on the slightest excuse, even in a gentle breeze. Frequently they will go all the way over so that the keel is uppermost. This means that the mast may get stuck in the sand or mud on the bottom. There have been cases where masts have been broken by this happening. Generally speaking, such small boats should be launched without masts and without the centerboard or any other loose gear aboard.

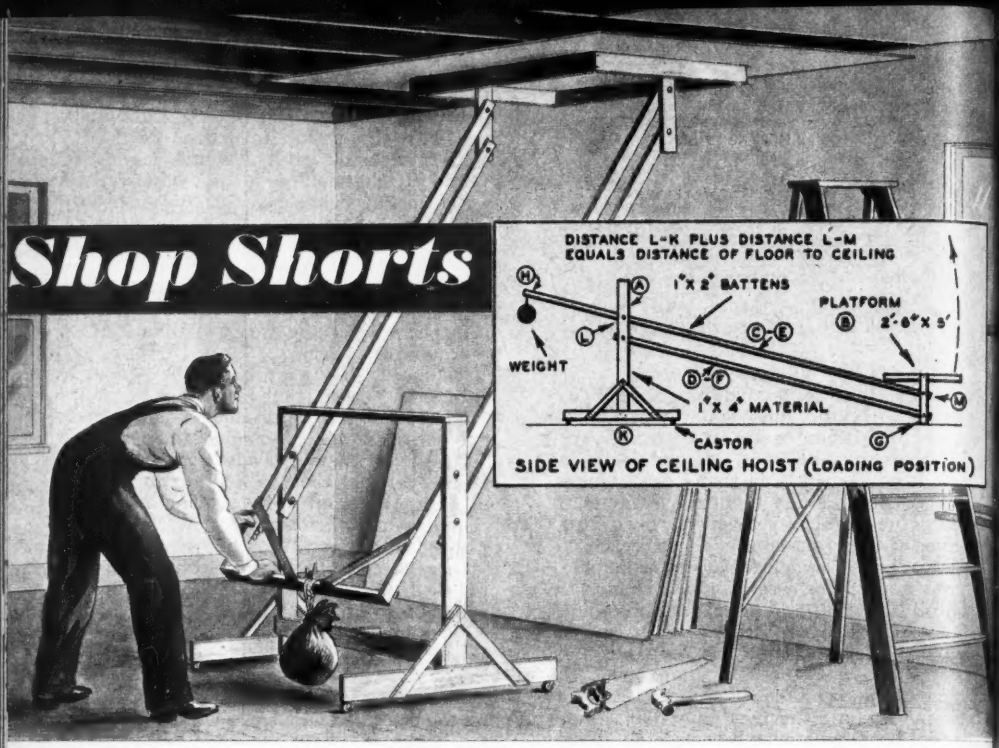
No matter how carefully you have caulked the seams, some leaks are almost certain to develop; so the longer you can leave the boat quietly at anchor, the better she will be for the entire summer. As the seams swell up, the caulking compound will be squeezed out; so if you plan to race, it is advisable to haul out again after two or three weeks to scrape off this excess material, which will form ridges throughout the length of the hull. The bottom should be painted again at this time.

Sometimes, where leaks are extremely stubborn, boatbuilders give a boat the "sawdust treatment." In this operation, a long handle is attached to a wooden box and the box filled with sawdust. This box is then scraped along under the bottom in the hope that some of the sawdust will work its way into the leaking seams and cause them to close up. The theory is that the water running into the hull will have some suction and this suction will pull in a few grains of the dust. •

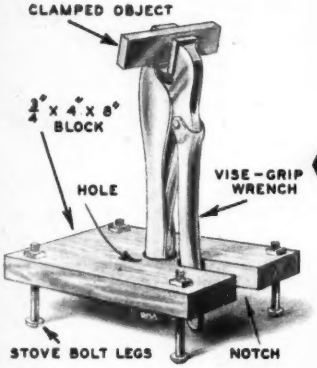


SAWDUST TREATMENT FOR LEAKY BOATS

Shop Shorts



ONE MAN can do his own setting and nailing of large beaverboard panels with the aid of this ingenious ceiling hoist. The side supports can be of any convenient height. The only critical point to consider is the parallelism of the sweeps. Weight at H plus the friction of the bolts will hold platform in any desired position.

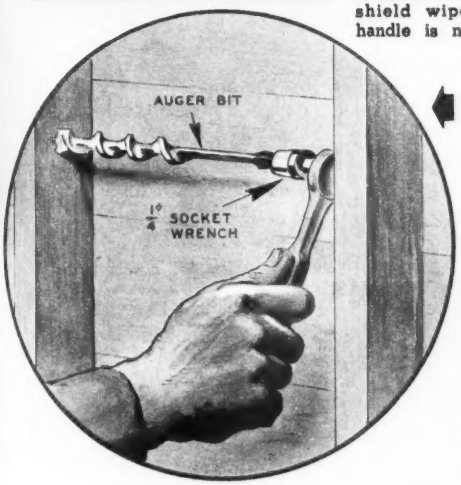


HANDY VISE for soldering and working on small objects can be made out of the new popular "grip" wrenches. Cut a ¾ in. board into 4x8 in. and mount four stove bolts as shown, for pedestals. Cut out one side of the board to allow room for the moving half of the wrench, and drill or cut a hole for the stationary jaw.

FOLDING SAWHORSE that can be carried in an automobile can be made by running bolts through the legs and top member instead of nailing the legs as is usually done. Nails are used only in the construction of the legs. These have extra cross members at the bottom for added rigidity. This carpenter's aid is especially useful to the man who carries his tools in his car.

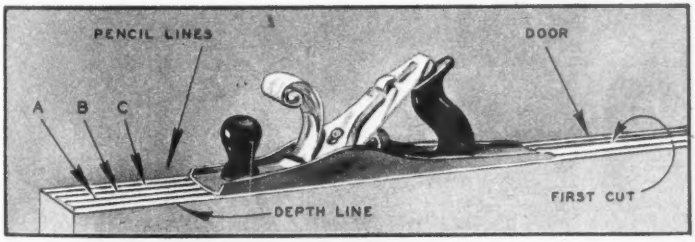
ODOR of burned insulation is a sure indication of a defective radio part or transformer. When arising from the power transformer it means an overload condition usually brought on by a shorted condenser or some other circuit part.

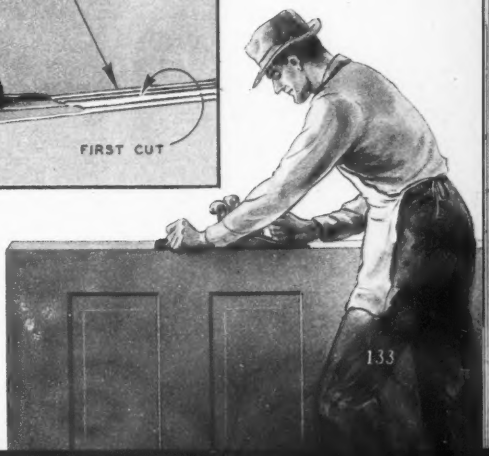
SQUEEGEE for narrow window panes is one thing your wife should appreciate during spring cleaning. You can make her happy by cutting one to size from a standard automobile windshield wiper blade. A handle is not necessary.



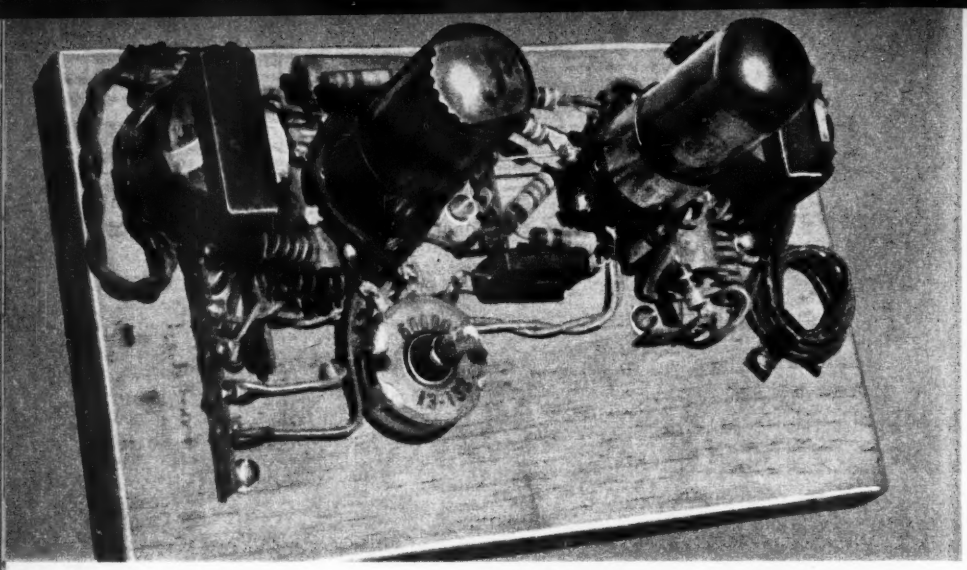
DRILLING in close quarters with an augur bit can be quite a problem at times. However, if you ever get yourself in the predicament as illustrated at the left, you can rescue yourself by using an open-end wrench to turn the augur.

NICKEL PLATING. Dissolve four pinches of nickel ammonium sulphate and pinch of salt in teaspoon of water. Wrap cotton around a battery carbon and connect to positive side of cell; negative to article. Dip cotton in electrolyte and rub over surface.





PLANING AID. You will find it helpful when planing edge of a door to draw several parallel pencil lines as shown above. By watching lines disappear as planing progresses you will be guided in maintaining correct cutting angle as you approach the finish cut.



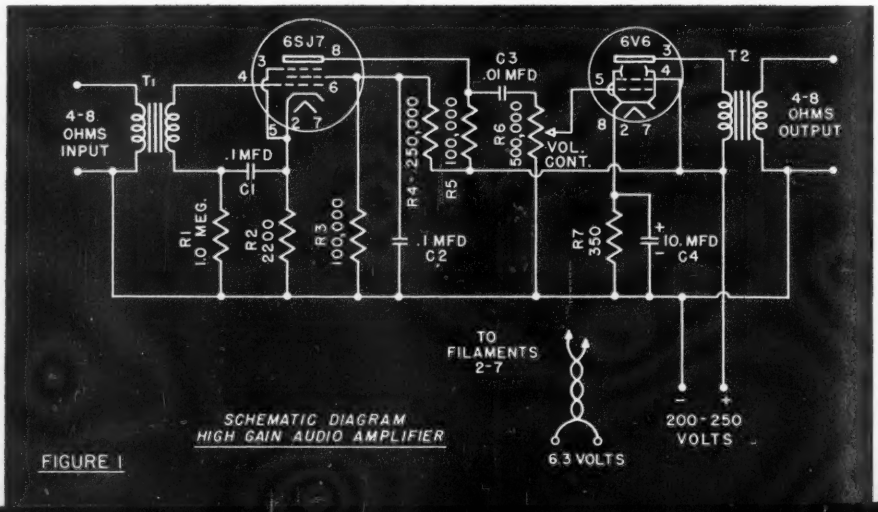
Experiments with a High-Gain Amplifier

BY THOMAS A. PARKER

THE construction of a "bread board" audio amplifier provides a lot of fun and certain applications of the finished amplifier can be very instructive. The amplifier pictured above uses parts that are readily available, and its circuit has been simplified to require a minimum amount of wiring.

Both the input and the output transformers T1 and T2 are identical. A standard "universal" output transformer is used at each end of the circuit. The 6V6 output tube has good power sensitivity and is easily driven to several watts output by the high gain 6SJ7 tube used in the first stage. The one megohm resistor R1 used in the grid return circuit of the 6SJ7 prevents strong input signals from overloading the grid, since any tendency for the grid to draw current produces a voltage across this resistor which in turn prevents the grid from drawing current.

The screen grid circuit of the first stage is stabilized by the addition of a 100.000



SCHEMATIC DIAGRAM
HIGH GAIN AUDIO AMPLIFIER

FIGURE 1

ohm bleeder resistor R3. This tends to keep the screen voltage relatively constant regardless of the signal fluctuations in the tube.

In constructing the amplifier, the parts can be mounted on a suitable wooden base or "bread board" as shown or they may be fastened more permanently to a metal chassis. For purposes of experimenting, the bread board arrangement allows more flexibility with less actual time spent in putting the outfit together. The layout allows very short wire lengths in the grid and plate circuits and no cross-over or close relation between the grid and plate circuits of the same tube. The complete circuit diagram is shown in Figure 1.

In performing the experiments to be described, the input transformer is removed and connected by means of a length of shielded cable to allow the use of the transformer as a "search" coil or probe.

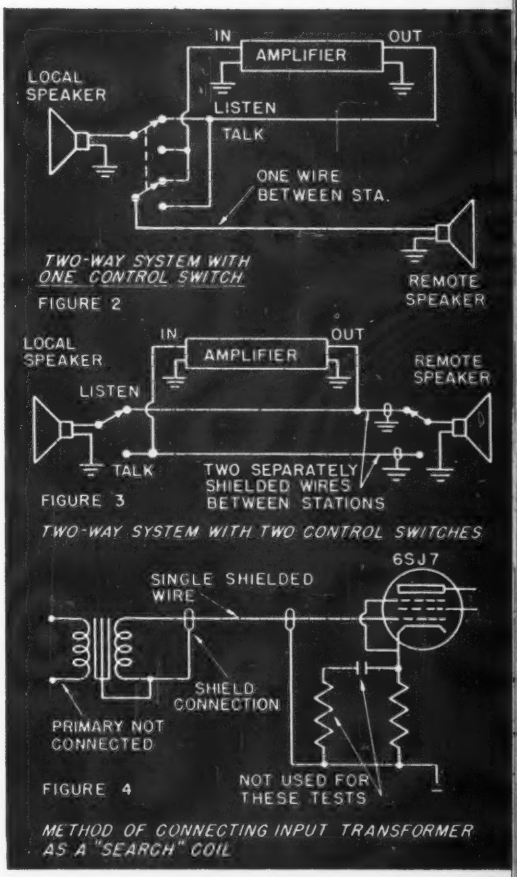
Wafer-type tube sockets were chosen for use in the amplifier because of their low cost. They are mounted on ¾" spacers with 1¼" No. 6 round head wood screws. Tie lugs are spaced around in the layout to provide convenient terminals for soldering wires, condensers and resistors. A screw driver adjustment was used on the volume control because it was more convenient. Since the amplifier was intended as an experimental unit, the transformer wires were not cut to exact length but were coiled to take up length.

The filament wires should be tightly twisted together and routed so that they do not come into close proximity with the grid circuits. The wire size used in the filament circuit should be at least as large as No. 20. If the filament wiring to the power supply is longer than about five feet, the wire size should be increased to No. 18.

Any suitable A.C. power supply may be used. It should be capable of delivering 200 to 250 volts D.C. at 50 milliamperes and 6.3 volts A.C. at .75 ampere.

After completion of the amplifier, connect it to the power supply and connect a permanent magnet speaker to the output. The proper impedance tap on the output transformer should be chosen to match the speaker voice coil. If the voice coil impedance is 4 ohms, use the 4 ohm tap on the transformer, etc. Connect another P.M. speaker to the input transformer, choosing a tap which will match the voice coil and at the same time provide as high an impedance to the grid circuit as possible. The input speaker should be located in another room so that acoustical feedback will not result. If it is possible to hear the output speaker while standing near the input speaker, they are too close together and the characteristic howl of acoustical feedback will be heard.

With the amplifier and speakers connected in this way, a simple one-way intercommunicating system is achieved. The loud speaker connected to the input acts as a microphone and will transmit sounds through the amplifier, reproducing them at the speaker connected to the output. The overall gain of the entire system should be something more than unity. To test this, place the pickup speaker near a radio and tune in a program. Keep the volume of the radio down to just above audibility and turn up the volume of the amplifier to maximum. Listen to the program at the position of the pickup speaker and then return to the position of the output speaker. The program [*Continued on page* 158]



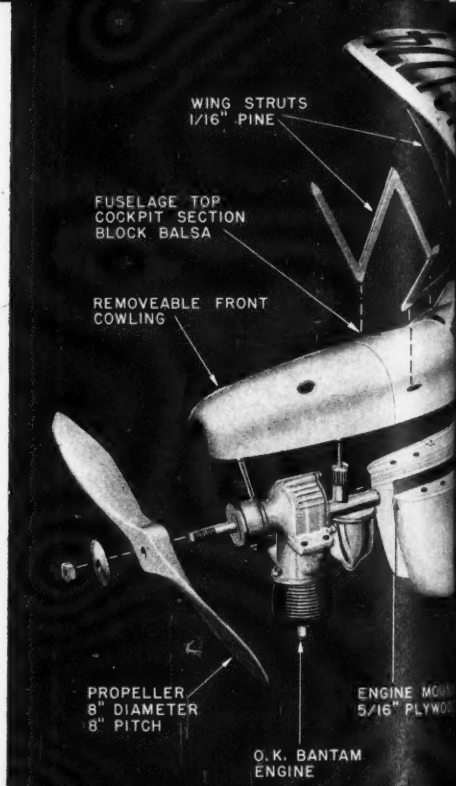
GREAT LAKES TRAINER

A 25-inch scale control-line model of one of aviation's most noted flying machines. Power with .19 to .29 engines.

BY DICK STRUHL

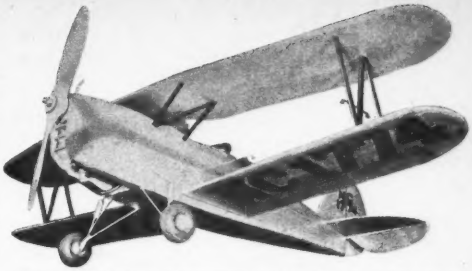
ONE of the most popular light planes of the '30's was the famous Great Lakes Trainer. In a sense it was the work horse of that era for in addition to being used as a trainer, it doubled as a sky writer, crop duster and the like. Of the many different designs produced during those years, the G L contributed as much to the growth of aviation as any other single airplane. Proof of the pudding is that some of the G Ls are still flying!

As a subject for a control-line model, the Great Lakes leaves very little to be desired. The strength of a bi-plane speaks for itself and the flying characteristics are ideal for the beginner as well as the expert. For sport flying, the G L has everything to offer; safe, consistent, easy flying. And here is a new wrinkle for those who lean toward acrobatics. Note that the stabilizer is set at a slight positive angle of incidence. This produces a faster take off and most important, when you are flying inverted and coming into the down-wind leg, the model will pick up speed—which can prove most disastrous if you are close to the ground. With a positive stabilizer setting, the nose will have a



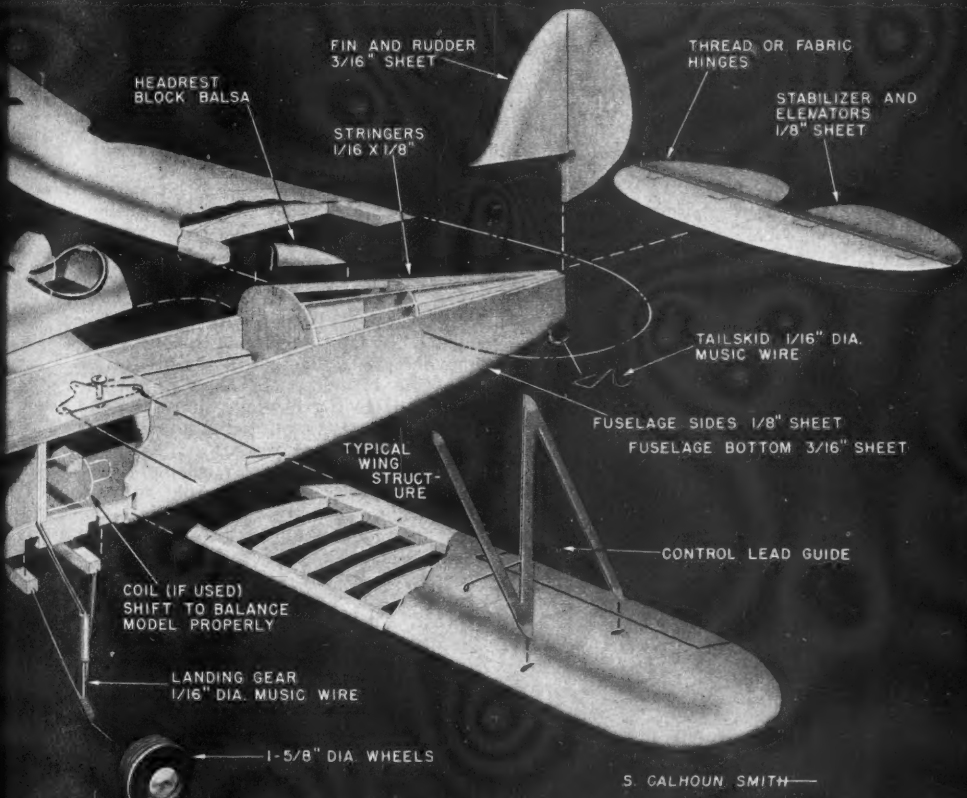
tendency to lift up when the speed is increased in inverted flight. Of course, just the opposite is true in the normal flight position but it is easier to correct the flight path than when the model is up-side-down. The original model used the O.K. Bantam engine for power but any other engine from .19 to .29 displacement can be installed. When using any other engine, just bear in mind that the center of gravity should be directly over the control plate pivot. Before starting actual construction obtain a set of full size plans by either enlarging the scale drawings or by sending 50 cents to the MECHANIX ILLUSTRATED Plans Service, Greenwich, Connecticut. Specify Plan No. 387.

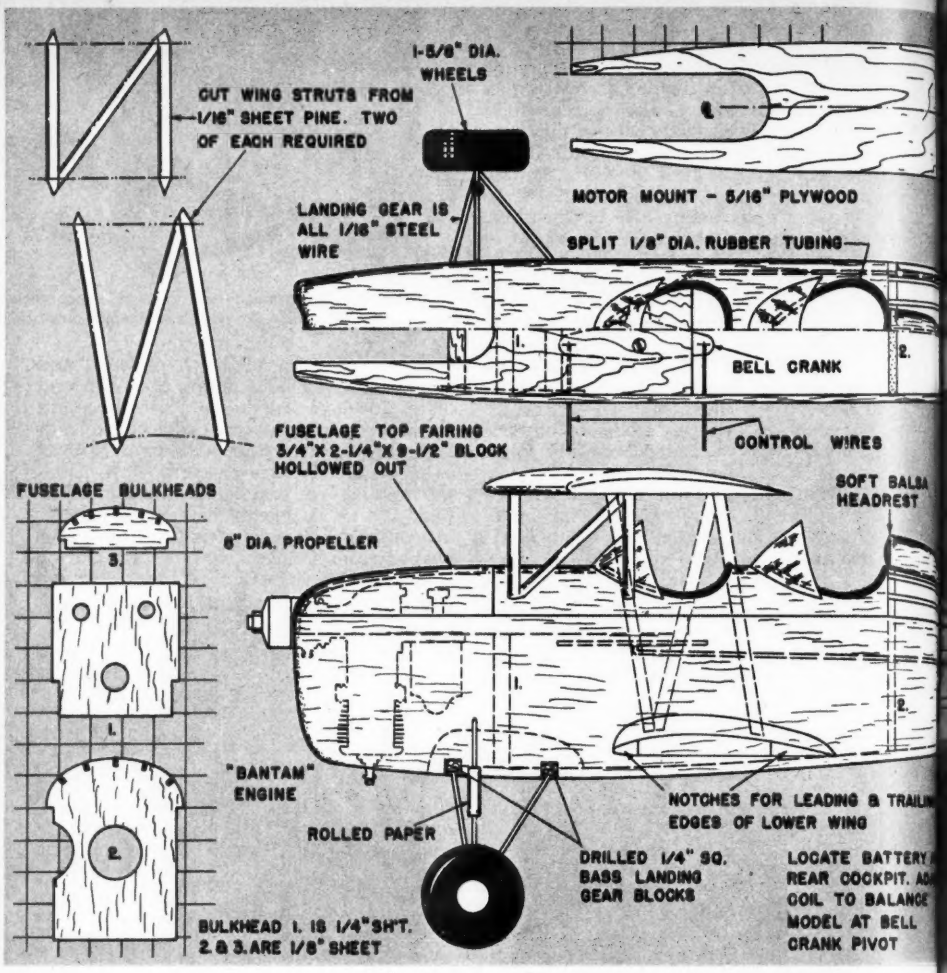
The fuselage is merely a box with a little fairing. Cut the two sides from stiff 1/8 in. sheet balsa and the fuselage bottom from 3/16 in. stock. To assemble, first pin and cement bulkheads Nos. 1 and 2 to one side of the fuselage. Now add the bottom and finally pin and cement the other side in place. When the cement has dried, join the tail ends together. Next, cut the motor mount



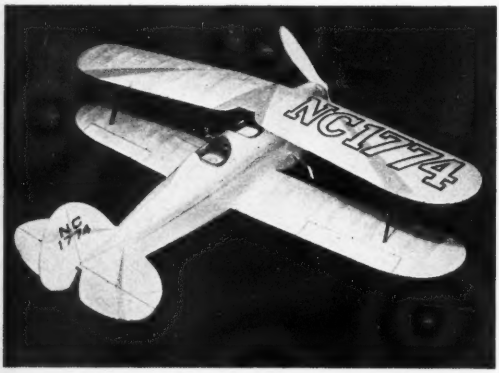
For consistent performance and realistic appearance, the G L has no match. Original was Bantam powered.

from 1/4 in. or 5/16 in. birch plywood and cement it in place, bringing the front end of the fuselage together to form the slight curve. If desired, the front edge of the fuselage may be backed up with some 1/8 in. x 1/4 in. strips for extra strength. Now install the landing gear braces and then add bulkhead No. 3. After the cement has dried, attach the 1/16 x 1/8 in. stringers. The top is shaped from a soft balsa block measuring 3/4 x 2 1/4 x 9 1/2 in. After the block is rough carved, cut the two cockpits and then scoop





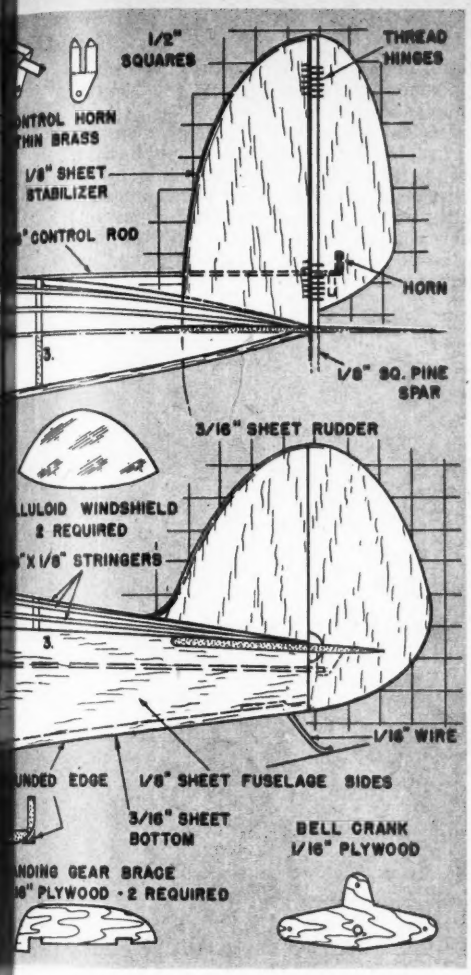
Easy to fly—and fly it will! Although small (wing span is but 25 inches), flying is stable even in brisk winds.



out the interior so a 1/8 in. wall thickness exists. The front portion of this block is removable, as indicated, to permit trouble-shooting, refueling, etc. The rear portion is cemented to the fuselage sides. Note that the bell crank is mounted on the underside of the motor mount plate.

The landing gear is now shaped from 1/16 in. piano wire. The pieces that act as the shock absorbers are free to ride in holes provided for them in the fuselage sides and are not connected together. The main gear members are inserted in drilled 1/4 in. square bass blocks and bound neatly with thread. These blocks in turn are inserted in the spaces provided for them in the landing gear braces. Use plenty of cement at this joint. The tail skid is 1/16 in. music wire.

The rudder is cut from medium 3/16 in. sheet balsa. The stabilizer is cut from 1/8 in. stiff sheet balsa and is made in one piece. The elevators are cemented to the 1/8 in.



FUSELAGE CONSTRUCTION

After bulkheads, fuselage sides and bottom are cut from the prescribed stock, cement bulkheads to one side, add the bottom and then cement the remaining side in place. Cut out the motor mount to fit your engine before attaching.

WING CONSTRUCTION

To mount bottom wing, cut out fuselage sides as shown and insert edges. Check incidence angle.

square hardwood spar and attached to the stabilizer by thread hinges. The control horn is bent from thin sheet brass or may be cut from a tin can. Note that the control rod emerges from left side of fuselage between bulkheads Nos. 2 and 3.

Both wings are quite simple and are built up directly over the full size plans. The top wing is built in one piece and has no dihedral; the lower wing is made in two halves. The tips are all solid balsa as are the four wing strut blocks. Carefully sandpaper the tips to follow the contour of the airfoil so no breaks exist. The lower wing leading and trailing edges extend a bit and are inserted into the fuselage sides. The wings are covered with GM Silkspan, sprayed with water and then given two coats of clear dope. The wing struts are cut from 1/16 in. thick sheet pine as indicated. Force the center section struts into the balsa fairing on top of the fuselage and then mount the top wing into position. The lower panels are inserted into the fuselage notches and then the outer wing struts are attached.

Bolt your engine in place and, if you are using a complete ignition system (coil, condenser and batteries), place the battery (Bright Star 459 or equivalent) in the rear cockpit and juggle the coil position so the model balances at the bell crank pivot. In most instances the coil position will be just behind the firewall but check the balancing point before permanently anchoring the coil in place. If you are using an Arden Glow Plug in your engine (which will

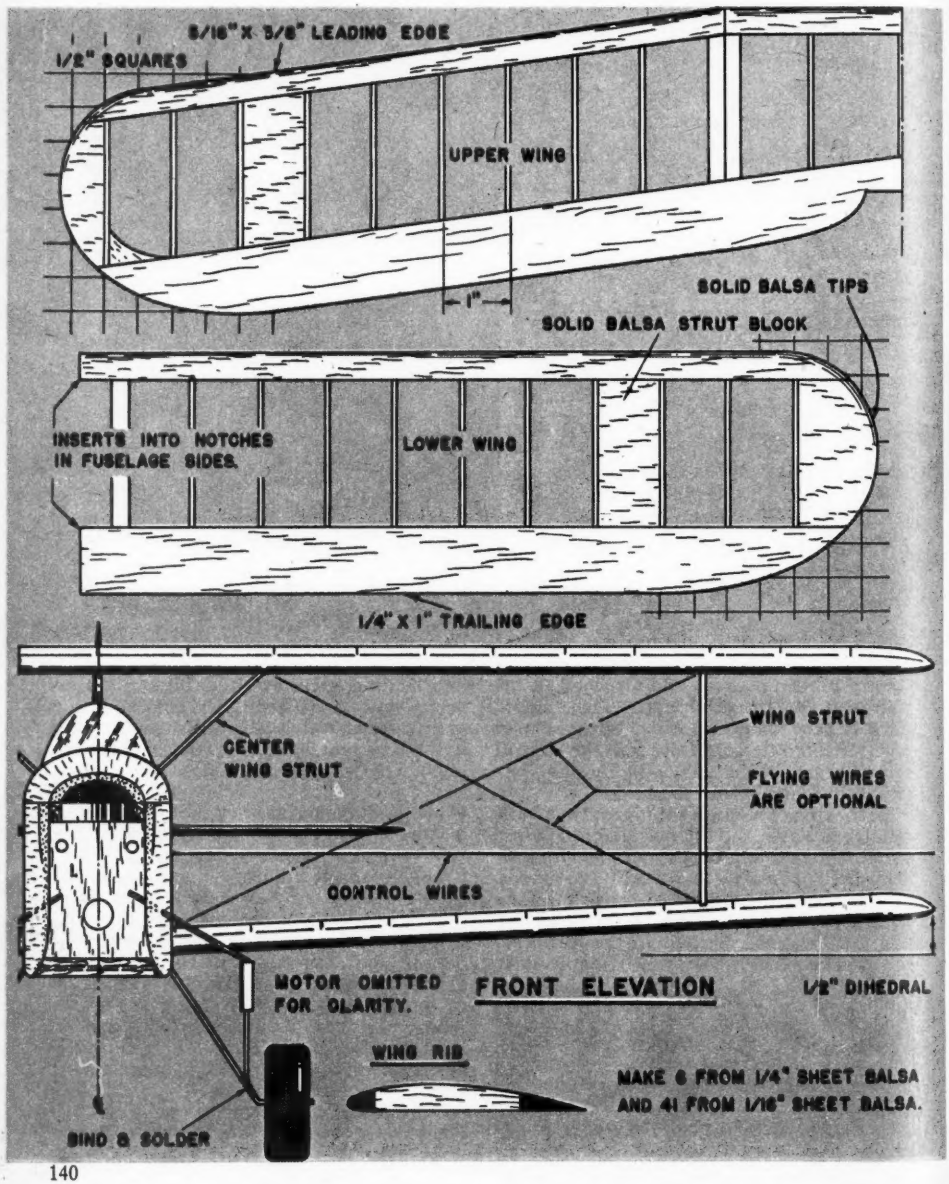
FULL SIZE PLANS

of this model are available from your local hobby shop or direct from MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut. Price: 50 cents. Specify Plan No. 387

eliminate the ignition system), a Drone or similar diesel power plant, then add lead to the tail to obtain the correct balancing position.

The model is now ready for the finishing touches. The MI job was colored all silver with red trim and black detail. Total weight was twenty ounces ready-to-fly with a Bantam engine using ignition. Undoubtedly 4 to 6 ounces can be eliminated by using a Glow Plug and the result will be greater speed, better maneuverability and—this is important — less damage when "rough" landings are made.

Use 35 foot .012 steel control wires for the first test flights. The day should be calm and the take-off area relatively smooth. Do not attempt to do any fancy tricks or stunts until you really have the "feel". Once you know your model you can try all the stunts in the book. Just like the McCoy—and we don't mean the engine!



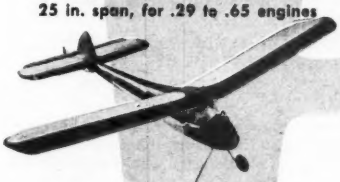
SHARKIE . . . . . Plan No. 377
22 in. span, Class VI, .60 engines

MR. MULLIGAN . . . Plan No. 374
39 in. span, for .29 to .65 engines

NIEUPORT SCOUT . . Plan No. 379
27 in. span, for .099 to .30 engines

P-47 THUNDERBOLT . Plan No. 375
20 in. span, for .099 to .29 engines

HUGHES RACER . . . Plan No. 381
25 in. span, for .29 to .65 engines



MI FLEETSTER*. . . Plan No. 376
Class A, for engines up to .19

MI ACROBAT . . . Plan No. 383
32 in. span, for .29 to .65 engines

***MI Fleetster is a free-flight model. All others are control-line.**

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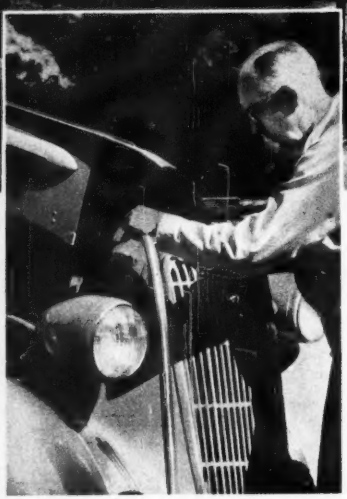
car care



Allow the engine to cool before adding cold water after draining the anti-freeze. You may save yourself a cracked motor block.

Now is the time to remove cardboard radiator shields you may have used during the winter to boost car heater's efficiency.

Oil loss past the rear main bearing may be due to sludge clogging the retainer. Oil is then prevented from draining back into the crankcase and leaks into the clutch housing instead.

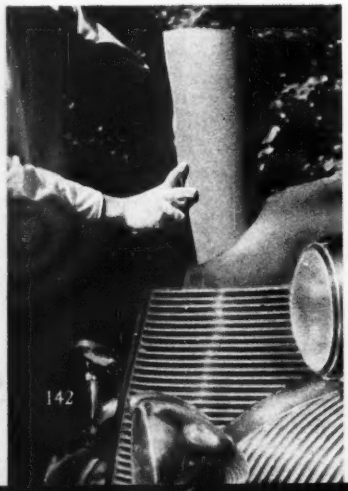
Power loss when the engine heats up calls for rechecking valve tappet clearances. As stems expand, the valves cannot seat tightly, thus lowering cylinder compression.

Weak clutch springs are indicated if you can press down the pedal by hand without too much effort. Weakness of the springs will mean slipping on hills and at high speeds.

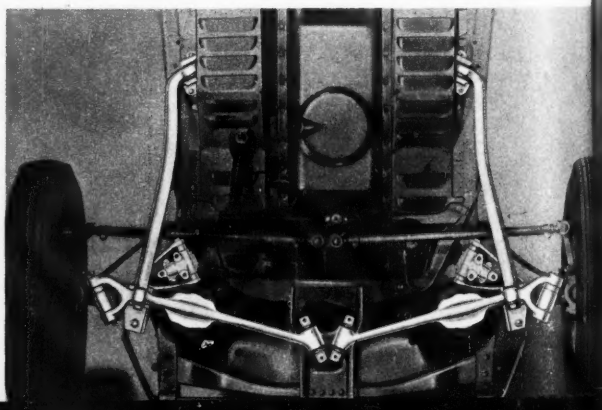
Burned breaker points indicate use of the wrong condenser. Use a 30 to 38 mfd condenser for moderate driving. Cut this to 24 mfd if you drive fast.

Most battery men punch the date at which your battery went into service. It's a handy guide to poor memories when things go wrong and you feel entitled to an adjustment.

Voltage regulators must always be at about 70° F. before adjustments are made.



Never allow gas station attendants to spray the knee-action units of the front wheels with petroleum lubricants. It will rot the rubber bushings of the shocks and the anti-sway bars.



BEHIND THE WHEEL

With Fred Russell

Would the addition of ether in the gas tank or hooking up an extra coil help starting? Clarence Koehler, Chicago, Ill.

I would not recommend ether or an extra coil. Good compression, light oil and a fully charged battery are the best aids to quick starting.

●

My 1946 Nash Starts fine when the motor is cold. But, after it has warmed up for 5 or 10 minutes I find it very difficult to restart again without a push. Wm. B. Shyne, Berlin, N. H.

Try cranking with the throttle wide open. Don't choke and don't pump on the accelerator.

●

I have a 1939 Crosley which is very hard to start unless it is pushed. Compression is so high that one person cannot push it when it is in gear. Car has been thoroughly checked and overhauled and has plenty of power. Lewis Finley, Spokane, Washington.

You may have too much compression for the size of your starter motor, especially when you say that one person cannot push it while it is in gear. A good cranking speed is necessary for starting, but if compression resistance is too high, the starting motor will not crank fast enough to suck in a sufficient charge of gasoline vapor.

●

Should a car be repainted with the same kind of paint as the original finish? How can one tell whether the finish is lacquer or synthetic enamel? B. Lorenzen, LaPort, Texas.

You can't do a good spray job without going down to the surface so it really doesn't matter if the original finish was lacquer or enamel. Most GM cars are finished in lacquer while Chrysler products are usually sprayed with enamel.

●

What causes the singing noise in the transmission of my 1941 Studebaker? Would a damaged rear motor mount be the cause? H. D. Dickson, Bath, S. C.

Clutch misalignment due to your faulty motor mount may be the reason for transmission noise.

●

Can decorative bar-type hub caps throw my front wheels out of line? Clifton Foster, Clearlake Oaks, Cal.

They may throw the front wheels out of balance, but not out of line.

●

I can only get 9 mpg with my 1940 Pontiac. How can I fix this? Harold Ginsberg, Bklyn., N.Y.

Check for a sticking choke valve, clogged air cleaner, or gas leak in the tank. Also make certain that the carburetor's float level is not too high. Any chance of gas being pilfered from the tank when your car is parked?

●

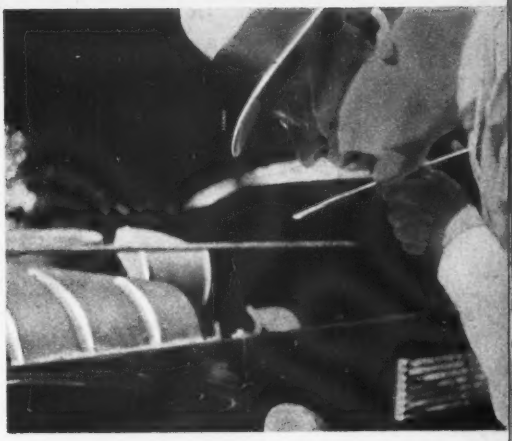
I am losing a lot of oil from the rear main bearing of my 1940 Willys. Need I remove the motor to replace the top half of this bearing? Herman Donoff, Baltimore, Md.

Yes. However, it seems to me that it would be a good deal less expensive to put up with the oil loss rather than tear the engine down.

●

As soon as I drive over 50 mph on my 1941 Ford, it begins to knock the tops off the valves. Mike Aro, Luling, Texas.

Best bet is to replace all valves and valve springs. Chances are weak valve springs are your trouble.



Odor of gasoline on the dipstick usually means excessive blowby and need of a ring job. However, first try freeing up the rings with a gum solvent.

Lateral cuts along the tire sidewall are a danger signal. Unlike crazing and checking, cuts are usually forerunner of a blowout or tire failure.

Safety is assured with this wheel block which is slipped under wheel before car is jacked up. Always chock the wheel diagonally opposite to flat.

MITRONIC "TWO"

Simplified photo speedlight is easily made of standard parts. Works with regular flash synchronizer and is powered from A.C. house line. Designed and built exclusively for MI readers by Ken Murray

IF YOU want simplicity of construction, of circuit, of operation, in a "strobe" type photo speedlight, this is it. It is a dream to assemble, there being only four main parts in this simple circuit. It is super-powered (210 watt-seconds). Although it does not have the deluxe appointments of Mitronic I*, it is completely contained in an airplane-aluminum case, only 11 in. high, and is beautiful to behold. The case holds most everything, including cables, synchronizer, Amglo lamp, even a folding Kodak or camera of equivalent size.

Most unusual, brand-new feature of Mitronic II is that *the Amglo lamp plugs into your regular synchronizer in place of the usual flash bulb!* Set your camera shutter at any speed you wish, 1/100; 1/200; 1/400, and never miss a shot. When the first model of Mitronic II was completed, a test run of 100 shots, spaced 10 seconds apart, were made with an ordinary Kalart Automatic synchronizer and a Kodak Valiant with shutter at 1/200. Synchronization varied not a bit!

How it is possible to plug the Amglo lamp into your regular synchronizer is revealed in the illustrations. Holding an Amphenol socket shell with pliers, drill a ⅜ in. hole in the side. File off any burrs and insert a rubber grommet. The bottom of the shell must be well cleaned down to the bare metal, so that it can be soldered to the top of a medium standard screw base. (You can remove a base from any standard burned-out lamp bulb, cleaning out the inside with a small chisel or other metal tool.) In the joint also solder the end of a short piece of insulated wire to ground the shell and base, as indicated in the detail drawing on page 147.

An 8-ft. length of spiral-wound, 3 conductor cable connects the fabricated plug with the Mitronic II unit. The conductors are color-coded. Unwind the wires at one end and introduce them through the grommet in the shell, from the outside. Draw the cable through so that you can solder the red (hot) wire to one of the large posts of a 4-prong Amphenol ceramic socket. Solder the blue wire to one of the small posts and to the short wire soldered to the shell joint. For these connections the insulation should be stripped only as far as actually necessary. The connections may in addition be wrapped with insulating tape. Solder the white wire to the bottom contact of the screw base. Actual wiring will be easier to follow by consulting the drawing, as it is quite simple. You can then snap the ceramic socket into the socket shell and the plug is completed, ready for later insertion of the Amglo 54R4X lamp. A 4-prong Jones plug, with each prong numbered, is connected to the other end of the cable. Solder the red wire to prong 2; the blue wire to prong 4 and the white wire to prong 1. The remaining prong, No. 3, remains unconnected.

On the stage, famed magician Blackstone causes pretty ladies to float in the air. At his summer home in Michigan, he raises cantaloupes! To make this deceptive picture, Blackstone struck the pose and dropped the mellon onto several pillows, not shown. The shot was made with Mitronic II by the author. Stop f-16 at 10 ft., Super XX film.

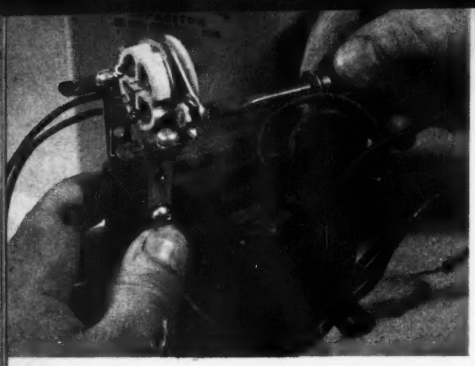
The power unit requires a 1750 v. transformer, the leads of which are usually color-coded instead of being marked:

Primary	Black
High Voltage Secondary	Red
Filament, common	Brown
Filament, 2½ v.	Yellow

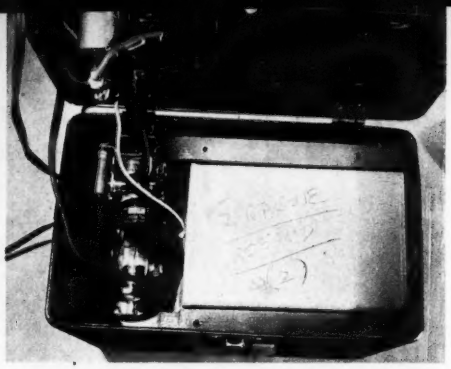
(Green is not used)

Assembly is made easy by mounting the

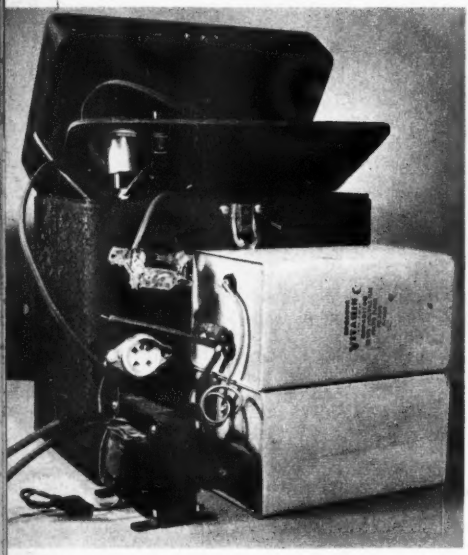
*See January 1948 MI.



To simplify assembly and wiring, rectifier tube socket is mounted to the top of transformer.

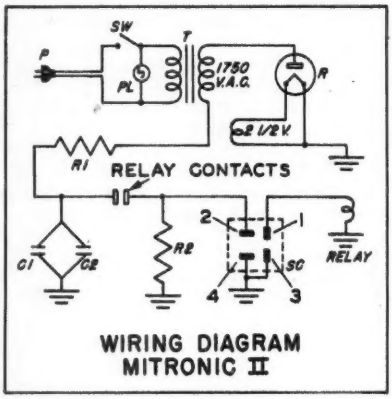


Top view of case, with control panel removed, shows compact layout of parts. Rectifier tube is horizontal.



The components are placed in front of carrying case to show exact position they occupy inside.

Top view of completely assembled unit, with flash lamp and cord resting inside the case. Above name plate is connector jack for the flexible cord on the lamp assembly. Below name plate are jewelled pilot light and line switch.

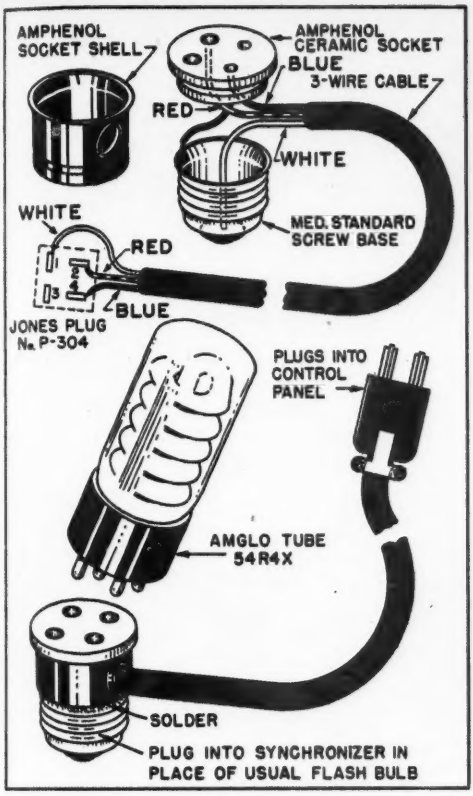


WIRING DIAGRAM
MITRONIC II

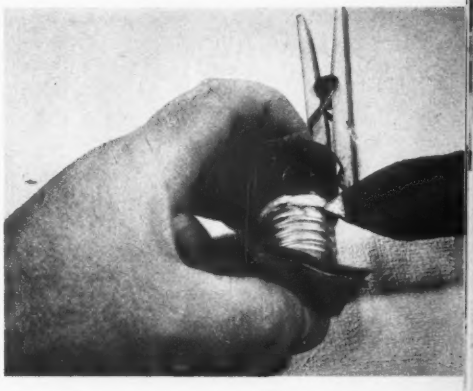
2x2A rectifier tube socket on top of the transformer with small radio angle brackets. The capacitors may likewise be wired together before fitting them into the case. Two 35 mfd., 2500 v. capacitors are used, to attain full 210 watt-seconds. A single 35 mfd. capacitor may be used with the same circuit, however, or if you wish you can start with one and add another later.

The third unit to be wired is the control panel with its Jones socket, pilot light, etc. Grounding is done through the transformer and relay frames, with the case as a common ground; connect a capacitor ground wire to the transformer frame or one of the angle brackets on it. An airplane-aluminum case, 11x11x6 in., in brown crackle lacquer, is used. Two wood inserts, coated with a waterproofing plastic paint, secure the capacitors in position. Screw the inserts securedly to the bottom of the case, and the control panel to the tops of the inserts. This completes a very compact, capable unit which should be

Below: Assembly details of the adaptor that permits use of speed lamp in place of ordinary flashbulb.



After three wires are soldered to ceramic socket, latter is snapped into adaptor shell.



Shell and lamp base are soldered together to complete speedlamp socket assembly.

the envy of friends who are using a less-inspired design.

Operation of the unit is fairly obvious; after plugging into a 110 volt A.C. outlet and flipping the switch, the speedlight will be ready to flash in about 30 seconds, and every ten seconds thereafter. There is no power in the connecting cable until the exact moment of flashing, and the unit will not flash until the lamp is inserted in the battery case of your synchronizer and the Jones plug into the control panel. Synchronizing is checked by the usual method of looking through the back of the camera; once set, it is perfectly reliable.

It should be especially noted that Mitronic II is a simplified unit and the circuit is stripped down to bare essentials. After the 110 v. current source has been disconnected, the capacitors will retain a charge for many hours and the voltage is lethal. There is no possible chance of harm unless the control panel is removed, however. If it is ever necessary to remove the panel, first flash the lamp and continue pressing the trigger for some time. Then, when the panel is lifted, short the *transformer* side of the limiting resistor, R-1, to one of the grounds, using a screwdriver with insulated handle. This will dissipate any residual electricity noiselessly and harmlessly.

LIST OF MATERIALS

P—Flexible two-conductor power cord, about 10-15 ft. long, with plug.
SW—Toggle switch, S.P.S.T., for 110 volts.
PL—Jewelled pilot light, 110 volts, 6 watts.
T—Power transformer, Primary, 110 volts, 50-60 cycles A.C. One 1750 volt secondary, one 2½ volt secondary. Amglo Type H-1341, from Amglo Corp., 4234 Lincoln Avenue, Chicago 18, Ill., or Electran Mfg. Co., 4587 Elston Avenue, Chicago 30, Ill.
R—Rectifier tube, type 2X2 or 2X2A.
R1—Resistor, carbon or wire wound, 10,000 ohms, 10 watt.
R2—Resistor, carbon type, 1 megohm, 2 watt.
C1, C2—Fixed capacitors, 35 mfd., 2500 volts. Sprague "Vitamin Q."
SC—Four-prong socket, Jones Type S-304-AB.
Relay—Single-pole, single throw type, with 2 volt D.C. coil. A special model for speedlamp work is available from Amglo (address above); or Guardian Electric Co., 1621 W. Walnut Street, Chicago, Ill., or Potter-Brumfield Mfg. Co., 549 West Washington Street, Chicago, Ill.
Amglo lamp, type 54R4X.
Case—Aluminum phonograph record case.
Plug—Four-prong. Jones Type P-304-CCT, with 8-10 ft. of 3-conductor cable.
Tube sockets—Two 4-prong Steatite radio tube sockets.

Save Your Shots

BY STANLEY JUDKINS

There's no point to reading this story if you never make a mistake—but if you do:

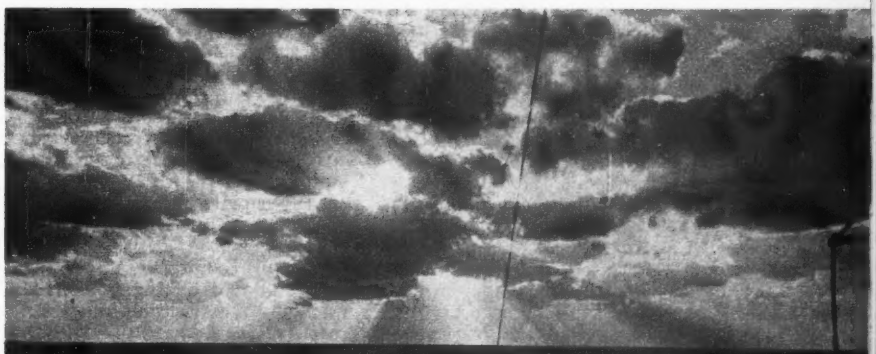
EVEN the best of photographers make occasional mistakes. In anticipation of such errors, it is not uncommon, even with the experts, to take several exposures of each subject, as a precaution against retakes. But, by making every exposure usable, the need for duplicate negatives can often be eliminated.

A poor negative is not always a lost picture. The first step is to find out what is wrong with the negative in question. Is it "flat" or is it too "contrasty"? The chief fault in the average amateur's negative is flatness and underexposure. This is so prevalent that most commercial photo

Left: A seashore negative is apt to be contrasty due to brilliant sunlight. Print such a negative on soft paper.

Above: Additional exposure would have brought out more detail in man's face. Print on hard paper will help.

Below: This shot was deliberately darkened in printing in order to subdue the water and the deck of ship.



Left: This is what a thin, flat negative looks like. A dense negative is not necessarily a contrasty one. It may be flat or contrasty.

Above: The result of printing the negative at upper left on a normal paper. Print is much too dark and lacks detail and contrast.

Use of No. 3 paper yielded this picture. Detail and proper contrast are now apparent. No. 4 paper would have made print too contrasty.

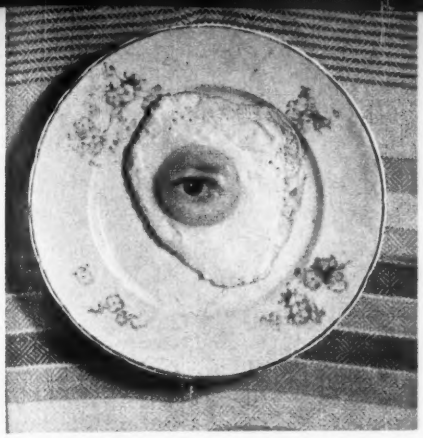
finishers use a No. 3 or "contrast" paper as their standard paper for 90% of all prints they process.

Variations in contrast can often be taken care of by choosing the proper grade of paper—soft, normal or hard. Always use a hard or contrasty paper for a soft or flat negative. While it is true that an overexposed negative is generally too contrasty, still and all, quite often such an overexposed negative is flat as well. In this case, the remedy then is to use a soft paper such as No. 1 or, in extreme cases use No. 0 paper.

If you do your own enlarging, you will find that the type of illumination in your enlarger influences considerably the resultant print contrast. If you have a condenser-type enlarger, you can soften the contrast of your prints by placing a diffusing medium, such as a piece of ground glass or opal glass on top of the negative.

For obstinate negatives which are apparently beyond the help of No. 0 or No. 5 paper, there is still hope. They can usually be made to yield an acceptable print by intensification or reduction; provided, of course, that there is anything at all in the way of a negative image to start with. For someone who uses intensifiers and reducers only occasionally, there is a certain amount of danger involved because sometimes these solutions act more rapidly than is expected, and unless the photographer is familiar with them, he may misjudge the extent of intensification or reduction, only to discover his mistake when it is too late. For this reason, if the negative to be treated is valuable, it is advisable to make a copy negative.

There are special films available on the photo market for this purpose which make unnecessary the cumbersome process of printing an intermediate positive transparency. Ansco Direct Copy Film, or Eastman's Auto Positive Film, for instance, can be exposed like an ordinary contact print. When developed, it produces a duplicate negative instead of a positive. Furthermore, the contrast of the copy negative can be varied by employing different developing solutions so that the copy negative itself may solve the problem of an increase or decrease in contrast. However, if you have read to this point, occasionally looking at one of your negatives while silently shaking your head because you know that nothing suggested so far is drastic enough, there are still the various types of intensifying and reducing baths which can be applied to either the original negative or a copy negative. Buy the ready-made packets which are on the market. •



$5.00 Award .....The Egg and I
A bit of whimsey created by Robert A. Bohlen of Rivervale, N. J. Neat double printing did the trick.

$5.00 Award .....The Morning Surprise
By Rudy Boger of Richmond Hill, N. Y. Taken with a Graphic 23, pan film, 3 photofloods.

$5.00 Award .....Just an Alley Cat
Taken with a Recomar 33 on Superpan film f-32, open flash. Arthur Schoeni, Arlington, Va.

photo contest

First prize ($10.00) .....With Cheeks of Tan
A 3¼x4¼ Graflex captured this youngster for E. J. Eisenmeier of Baltimore. Open flash.

Please put your name, address and complete picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope or postage for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Address: Monthly Photo Contest Editor, MECHANIX ILLUSTRATED, 67 W. 44th Street, N.Y.C.

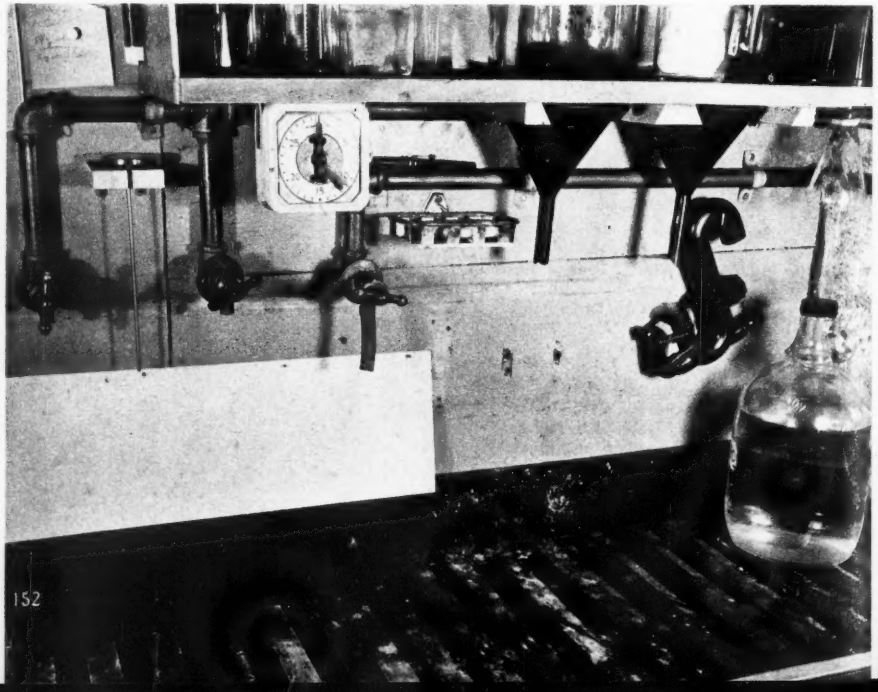
TIMELY TIPS

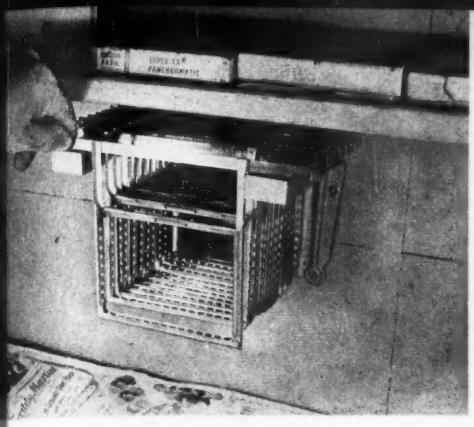
Cord holder. A spring-type clothes pin can prove to be a handy gadget when using extension lights. Coil the excess cord into a loop and keep it in place as shown in the photo above. Better than tripping over wire.

Measuring bottle. A half-gallon bottle, calibrated by means of adhesive tape, makes a convenient measuring jug for the odd amounts of solution required by many film developing tanks. Use waterproof tape and mark it with a grease pencil.

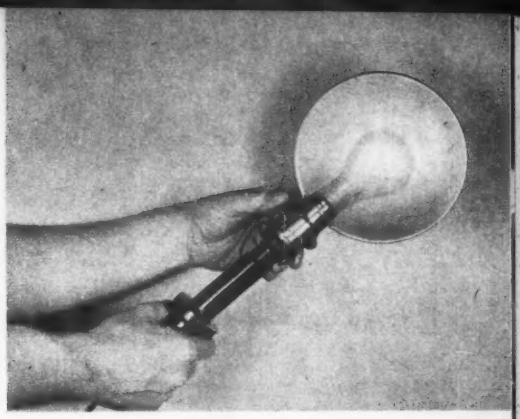
Tank cover. A good light-tight cover for tank developing can be made by inverting a cardboard box over the tank so that it rests on its cover which has been placed under the tank. See the photograph at the left.

Handy shelf. By fitting beveled cleats to the bottom part of the shelf usually placed over the sink, you can utilize much hitherto wasted space. Timer is supported with angle irons. Note how funnels are kept in a dust-free position.





Hanger hangar. A couple of shelf brackets and two lengths of wood, mounted as shown in the photo above, are all you need to store your film hangers safely. Saves a lot of fumbling prior to developing.



Photoflood gun. This extension for photoflood lighting is made out of a socket, cord, reflector and a plastic tube. Instead of the tube, which serves as a handy grip, a large dowel can be used.

QUESTION BOX

By Robert Brightman

If you want a personal reply, enclose a self-addressed, stamped envelope.

Is there a waterproof printing paper made? A. Schwedland, Des Moines, Iowa.

The paper you are referring to is known as "Resisto." It is made in enlarging as well as contact emulsions; it has a waterproof backing which seperates the emulsion from the paper stock. This way, washing time is cut to a minimum of about two to three minutes.

●

Can I fit a flash gun on my Kodak f-6.3 camera? Bill Jacks, Hamilton, Ont.

If your camera has a self-setting shutter, you should use a "passive" synchronizer. This type is made by the Kalart Company.

●

Is there a market for film spools and 35mm cartridges? Arthur C. Patrick, Jr., Provincetown, Mass.

We understand that the Eastman Kodak Co. is again in the market for film spools and 35mm cartridges. Their current rate is ½c per spool. However, they are interested in large quantities only.

●

Can I copy with my Argus camera? Clyde Brooks, Jr., Greenville, Tenn.

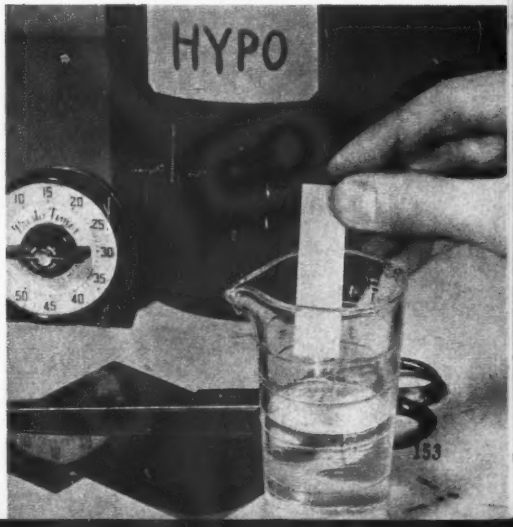
Yes, purchase a "portrait" or "copying" attachment. With this lens you will get a table showing at what distance your camera must be when photographing objects of various sizes.

●

Can I develop two rolls of film in one tank? Robert Noyes, Kensington, Md.

Yes, you can develop two rolls of film in one tank, provided your tank is designed to do this. Some tanks have enough room at the end of the reel for the insertion of an extra roll of film. With other tanks it is necessary to insert both rolls of film at once, back to back, with the emulsion facing outwards.

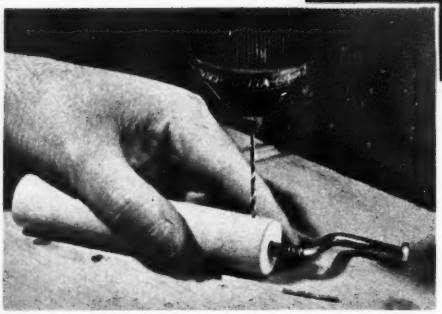
Album expander. Scotch tape hinges will more than triple the capacity of your album if you mount your pictures as illustrated above. Data on the backs of the prints can then be consulted.



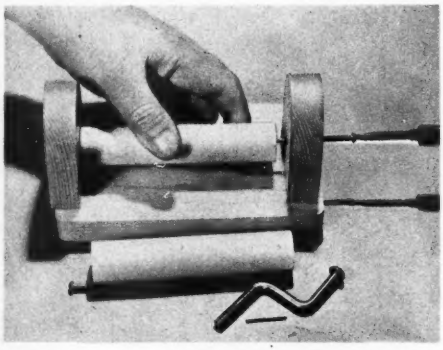
Hypo exhaustion test. Drop a piece of undeveloped film in the hypo you want to test. If it does not clear in 5 minutes, discard the solution. This test may be carried on in daylight with fogged film.

Darkroom WRINGER

Like coffee, good to the last drop.



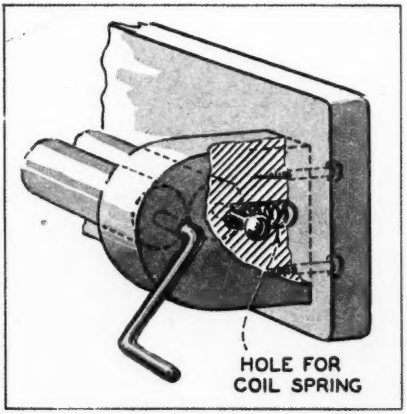
Place the crank in the end of the roller when drilling the hole for the locking pin. Below: Several coats of white sidewall rubber should be applied to both of the rollers to give them a cushioning effect as well as to waterproof them.



ONE gadget the prolific photo accessory manufacturers appeared to have missed up on is a wringer to dry out viscose sponges. The drawing and picture show how this useful little item is put together.

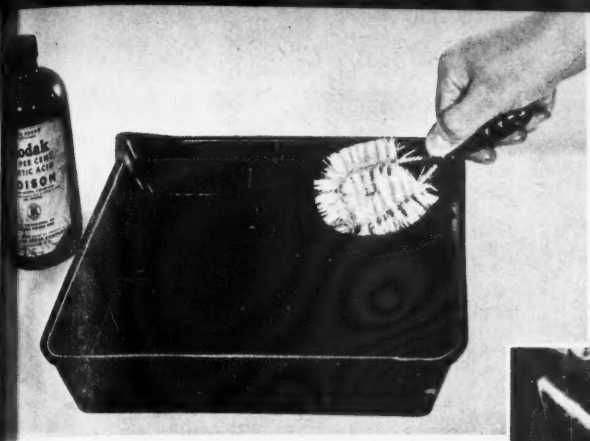
The wood base and supports can be cut from pine; two pieces of broomstick make excellent rolls, and the shafts and crank consist of ordinary machine bolts. Drill ⅛ in. shaft holes in the exact centers of three of the roll ends so that when bolts of that size are inserted they will not drop out. Drill a ¼ in. hole in the other roll end for the crank.

Notice that the rollers are held together by two springs which press on the roller shafts. Drill holes for the springs in the bottoms of the side supports. •



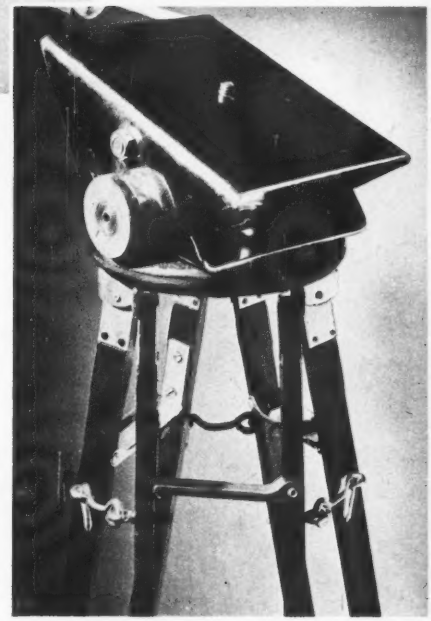
Left: Screwing a roller in place. The crank is held in place with a pin cut from a brad or nail. Garden hose may also be used as a rubber surface.

PHOTO HANDIES

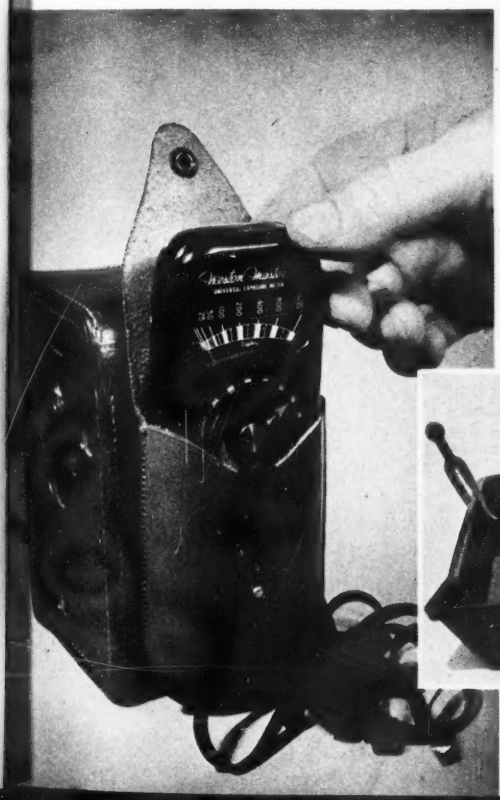


COME CLEAN. A stiff brush of the type used for cleaning vegetables, when used with a 28% acetic acid solution, makes an ideal tray cleaner. It's the developing tray that usually needs this treatment.

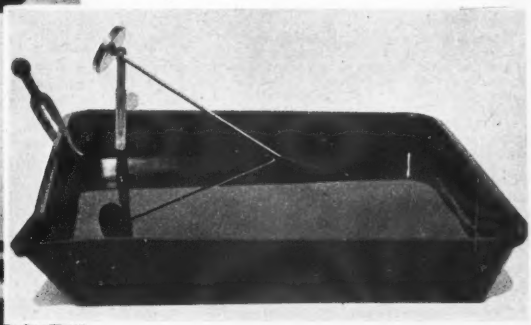
STAYS PUT. To eliminate the possibility of tripod legs skidding on a waxed floor, try this stunt. Insert three pairs of hooks and eyes on the legs. The height at which to insert the hardware will be determined by length of hooks.



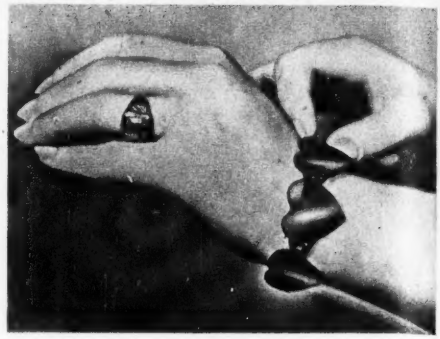
NEVER ASUNDER. As a rule it is much more convenient to carry the light meter and camera as a single unit rather than as two individual pieces. This can be accomplished by sewing the two cases together, back to back, as shown.



TRAY CLIP. Weston thermometers are usually hard to keep properly immersed because of their tendency to roll on the edge of a tray. Remedy this by inserting the stem through a hole drilled through a clothespin. Clip clothespin on edge of tray.



Plastic Bracelet



RUBY red plastic is an ideal material for making this flexible bracelet which has six heart-shaped links. To start it off, lay out the links on ⅛ in. sheet stock, jig them to shape. Then smooth the edges with fine sand-in a 250 degree oven, cup the heart slightly and bend the tongue to form the hook. Next, the loop of the first and bend the end back. Repeat until all the links are connected. •

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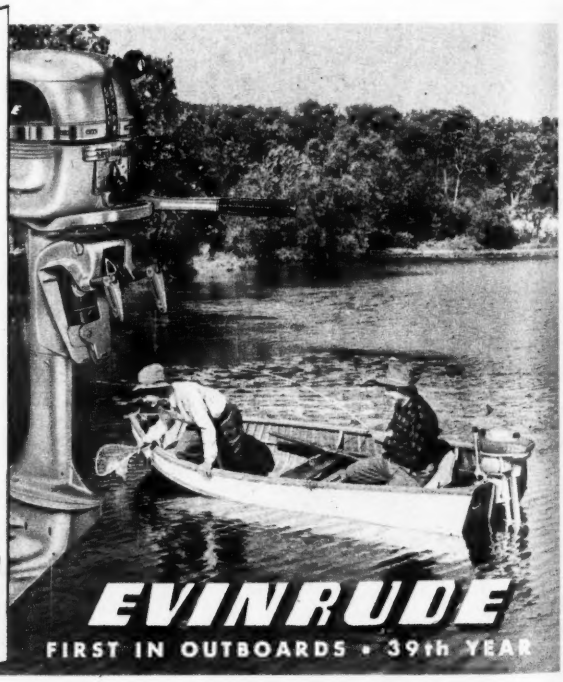
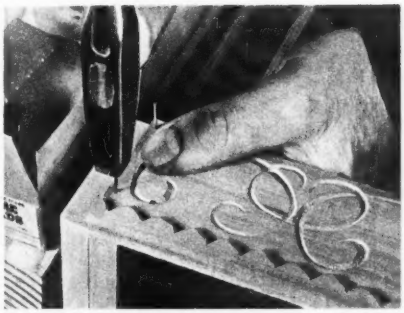
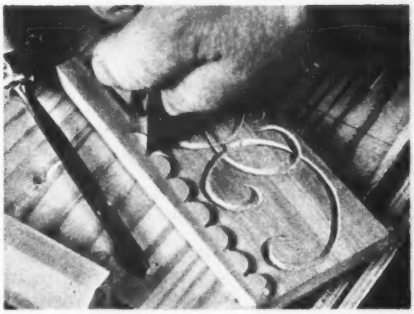


handy MATCH BOX

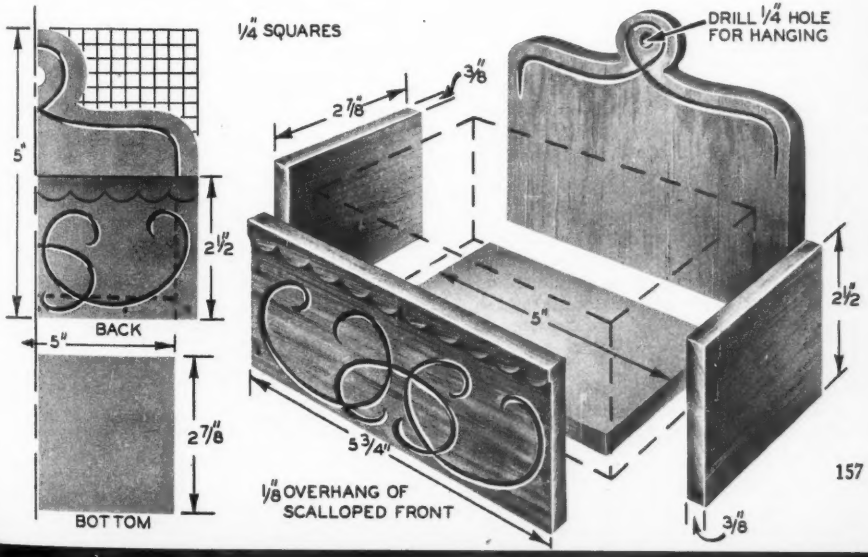
WHETHER you're lighting a candle, a pipe, or the kindling on the hearth, it's a convenience to have a match right at hand. Here's a little box that is attractive enough to grace any room in the house and is designed to hold the standard box of kitchen matches. To make it requires but a few scraps of wood and an evening's time. Philippine mahogany or other fine wood, ⅜ in. thick, is used. Cut the pieces to size and shape. The carving, which is done before the box is assembled, is easy, requiring but two woodcarving tools—a V-gouge and a ½-in. curved gouge. Assembly is simple, too, all joints being butted and held with glue and small brads. To finish, apply several coats of thinned, clear varnish rubbed to a satin finish and further polished with wax.—*Doris Aller.*



An extra piece of stock in the vise overlapping the side piece eases getting the corners flush.



Cut scroll design with a V-gouge and scallops by driving straight down with a curved gouge.



Experiments with a High-Gain Amplifier

[*Continued from page* 135]

should sound slightly louder at the output speaker than at the radio itself, assuming that your ear is approximately the same distance from the source of the noise in each case.

When the system has been built and tested as described, a number of experiments can be made. To make a simple two-way talking system with one station in control, connect a spring-loaded double pole switch as shown in Figure 2. This method uses only one wire between stations. The return path is through any convenient ground connection such as a water pipe, a heater pipe, etc. The switch should be spring-loaded to return to the "Listen" position when not held down in the "Talk" position. In this way the remote speaker will be normally in "Talk" position and any noises picked up in its vicinity will be heard at the controlling end of the circuit. This system is very helpful and practical as a means of keeping anxious parents advised of the goings-on in the children's bedroom. The control end of the system may be in the parents' bedroom or in any room desired.

In the case of larger children or where it is required to have control of the system from either end, two spring-loaded switches are needed and two wires between stations are used. See Figure 3. For long distances between the two stations, the wires should be *individually* shielded. A pair of wires with shielding over all is not suitable due to the coupling between the input and output circuits which would cause electrical feedback.

In either of the two systems just outlined, the amplifier need not be located near the speakers. It may be housed in a closet or in the basement or attic out of the way. It may even occupy a space on the experimenter's bench in some part of the house. In one application, the amplifier and local speaker are in the garage workshop and the remote speaker and control switch are located in the kitchen. The interconnecting shielded wires, of course, are of a rubber-covered type.

More complicated intercommunicating systems can be worked out by special switching circuits and the use of more speakers placed where required.

The amplifier can be used to study and demonstrate certain electrical principles. First connect the input transformer from the grid of the 6SJ7 to the negative power supply circuit by means of a length of single shielded rubber covered wire, as shown in Figure 4. The input transformer can now be used as a "search" coil or probe to carry out these demonstrations.

Tune in a program on a radio receiver and turn down the volume to a point *just below audibility*. With the amplifier volume at maximum and a speaker connected to its output, bring the search coil near the output transformer on the speaker of the radio. This is frequently mounted directly on the frame of the speaker. With the core of the search coil in approximately the same plane as that of the radio's output transformer, the radio signal should be picked up and amplified, being reproduced by the speaker connected to the amplifier. Rotation of the search coil will show that the signal pickup is at a minimum when the two cores are at right angles to each other. This demonstrates magnetic coupling or "transformer action."

In handling the search coil, a certain amount of hum may be induced into the amplifier by the hands contacting the coil winding. Avoid this by handling only the corner of the mounting bracket or by mounting the coil on a piece of wood or other non-metallic material.

Using the pickup coupling arrangement just described, reduce the coupling or the volume of the radio until the signal is very low in volume at the output of the amplifier. Then place a piece of cold rolled sheet steel at least $\frac{3}{32}$ in. thick and approximately 6x6 in. square between the search coil and the radio transformer. The signal should materially diminish or disappear due to the magnetic shielding effect of the steel. This demonstrates the effectiveness of steel or iron used as a magnetic shield.

Bringing the search coil near the power transformer of the radio will demonstrate the large A.C. magnetic field surrounding it. This field is sometimes induced into other components in the radio causing severe hum in the output of the radio. A well designed radio, of course, provides proper isolation and shielding to prevent this.

Other tests and experiments can be made and many uses of the simple "bread board" amplifier will suggest themselves to enterprising readers.

AMPLIFIER PARTS LIST

T1, T2	Universal Output Transformers, UTCR-38, R-58 or equivalent
R1	1.0 megohm, ½ watt Resistor
R2	2,000 ohm, ½ watt Resistor
R3, R5	100,000 ohm, ½ watt Resistor
R4	250,000 ohm, ½ watt Resistor
R7	350 ohm, 1 watt Resistor
R6	500,000 ohm Potentiometer
C3	.01 mfd., Mica Insulated Condenser
C1, C2	.1 mfd., 400 volt Paper Condenser
C4	10 md., 50 volt Electrolytic Condenser
1	6SJ7 Tube
1	6VG Tube
2	Octal Wafer Tube Socket
1	One-Lug Terminal Tie Point
2	Two-Lug Terminal Tie Point
2	Four-Lug Terminal Tie Point
4	Spacers, ¼" O.D. x 5/32" I.D. x ¾" Long
4	Wood Screws, No. 6, 1¼" Long
10	Wood Screws, No. 5, ⅜" Long
2	5" or 6" Alnico Permanent Magnet Speaker, 4 ohm Voice Coil
2	D.P.D.T. Lever Action Switches, Centralab

concrete FLOWER BOX

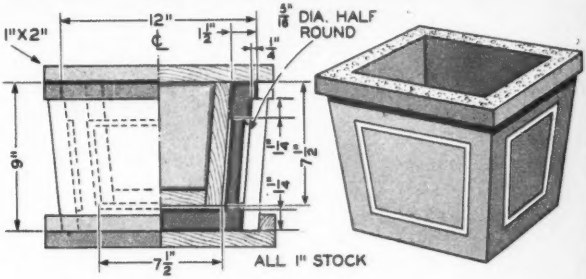
Photo Courtesy Portland Cement Association

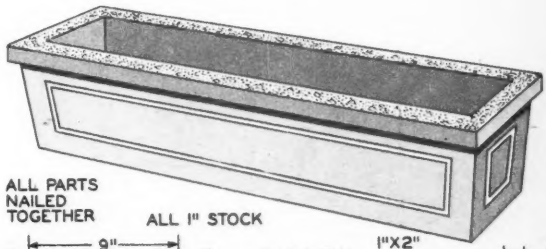
CONCRETE, being rotproof and rustproof, is an ideal material for flower boxes. Make the forms as shown in the accompanying drawings, nailing the parts lightly together. Sandpaper all concrete-contacting surfaces and apply two or three coats of shellac; then paint all the inside surfaces with thin motor oil.

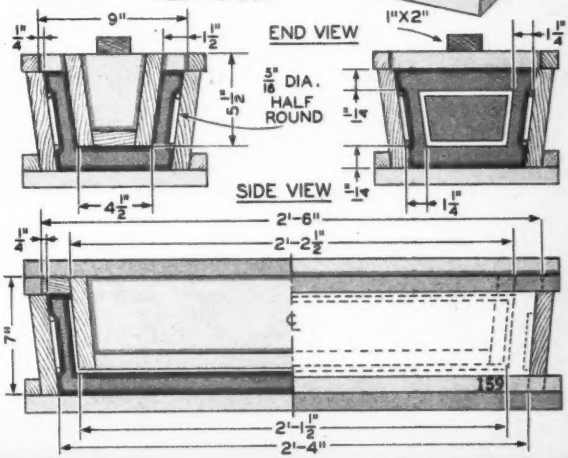
To mold one large flower box requires six quarts of cement, 10 quarts of clean sand, 12 quarts of clean gravel, and three quarts of water. If the sand is nearly dry, an additional ½ quart of water may be used. Mix the sand and cement on a flat surface, add the gravel, and continue mixing until the pebbles are uniformly distributed. Form a hollow, add some of the water, and mix, continuing to add water until it is all used and every pebble is coated with cement paste.

Pour the mixture into the mold, working it into all corners. When the mold is filled, smooth the surface with a trowel. After several hours, round off the top edges of the concrete. Allow 48 hours to harden, take the molds apart, and patch any irregularities with a wash of cement and water mixed to the consistency of thick cream; then coat the entire surface with this mixture. To cure, set in a shady location, cover with heavy burlap, and keep moist for a week.

The ingredients for one small flower box are four quarts of cement, seven quarts of sand, eight quarts of gravel, and two quarts of water. Although not necessary, the finished project may be painted, using white or colored cement paint, if you so desire.—*Thomas Trail.*







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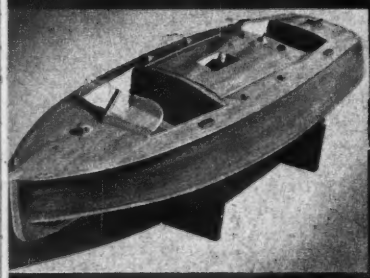

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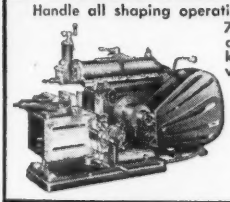
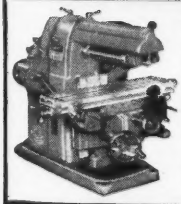


Handle all shaping operations within a 7" stroke—dovetailing, keyseating, vertical and angular cuts. Timken bearings. 4 speeds. Operates from ½ HP motor.

Atlas MILLERS



Gives you full range of milling operations—slabbing and facing cuts, end milling, keyways, boring, layout work. Timken bearings. 8 spindle speeds. Operates from ⅓ HP motor.

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Invasion Base on the Moon

[*Continued from page* 62]

although probably cold, will be even. If the moon men find no natural cave, they can make an artificial one by tunneling about 500 feet into a mountain.

Before the earthmen can solve any problems on the moon, however, they will have to set up an atomic pile; this will be the key to their permanency on the moon. The atomic pile will produce the heat, and this, in turn, will produce the steam which will run any construction equipment needed. And eventually the pile will produce the air and the water by which the moon pioneers will live.

While the moon men build their atomic engines, they will live on the rocket ship that brought them to the moon, and use a supply of air and water from the earth. Space suits, with airtight joints. Plexiglas head bubbles and built-in heating units will enable them to work away from their ship on the lunar terrain.

The cave shelter will be sealed off by an airlock, a set of two airtight doors with a space between them. In this way, only the air in the space between the two doors will be lost each time someone enters or leaves.

Additional fresh air will be made right on the moon. Since oxygen atoms are locked in most rock compounds, decomposing the rock will liberate breathable oxygen. Hydrogen—needed to combine with oxygen to form water—also is hidden in many minerals. These elements can be liberated from their rocky prisons by energy from the atomic pile, which produces this energy continuously by transforming heavy atoms into lighter atoms. With this unlimited atomic energy, many of the necessities of life can be extracted from the rocks forming the mountains of the moon.

With the cave supplied with air and water, the moon men will draw further on their atomic pile for heat and light, by steam and steam turbine, and electric generator.

The lamps which light the cave will be Vitamin-D-producing sun lamps capable of supporting plant life. Since the crushed rock of the moon's surface will be useless as soil, hydroponic gardens will produce tomatoes, cucumbers, lettuce and other vegetables. The breath of the men in the cave will supply the carbon dioxide necessary for these plants. The plants, in turn, will give off oxygen.

A moon crater will make a natural base for invasion rockets. The high, circular rim of the crater will act as a bunker against external bomb blasts, and the upthrust of the lava rock in the center will provide an elevated platform for a control dome.

Almost impossible to spot among the maze of surrounding pits, the crater is easy to guard against ground invasion and can be destroyed

[*Continued on page* 164]

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Old-Time Railroad

[*Continued from page* 70]

the model was assembled, water in the boiler and a head of steam from alcohol fuel in the firebox are all that are needed to operate this Lilliputian "Mogul" under its own power.

All over the Kimball Ranch—in the spacious, modern home, in shelves along walls, in the artist's studio, in the yard, in outbuildings and other storage spaces there's an almost bewildering collection of antique railroad equipment. Much of it few modern train travelers would even be able to identify. There are old locomotive headlights that burned kerosene or Pintsch gas, old bells, whistles, coach and station lamps, pot-bellied cast-iron stoves, and white-washed coal burners that once heated trains and depot waiting rooms. There's a museum of telegraph equipment, conductors' lanterns, wash basins from ancient Pullman cars, public drinking cups and roller towels.

The Kimball Library of Railroading contains more than 1,000 books, volumes covering every imaginable subject from 1835 until the present. It also has a vast collection of old railroad time tables, advertising lithographs, travel guides, railroad songs, tickets, passes, and other printed matter—much of it from railroads that have rusted into history. A tremendously fascinating section of the library is an assortment of railroad patents, patent drawings, lithography and working patent models.

Whether or not you are a model-railroader, if you should happen to be driving through picturesque San Gabriel Valley in the future, be sure to stop by and observe the Grizzly Flats. You'll see for yourself a railroader who is literally "riding his hobby." •

Invasion Base on the Moon

[*Continued from page* 162]

only by a direct atom-bomb hit—a practically impossible feat from our atmosphere-blinded earth.

The rocket-base construction will be comparatively simple. It will only be necessary to build a ring of concrete launching pits and connecting service roads, easily laid on the level pumice that fills the crater.

Thus, an atomic pile and a few simple elements are all that will be required for an invasion base on the moon, once the interplanetary explorer "stakes" the earth's satellite for his country. When this happens, the moon may lose its "June-spoon" romance.

Then it will set the scene for world-shattering war, unless earthmen meanwhile find peaceful means of settling their disputes. •

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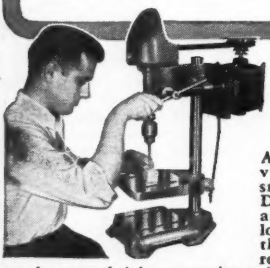

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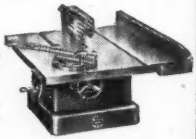

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What's New in the '48 Cars?

[*Continued from page* 74]

snow and mud. When I spoke to several autoists who have driven the Buicks with this new drive, they were enthusiastic about its performance.

The only other fresh features in the '48 Buick are some new engine mounts and a redecorated interior.

CROSLEY: With the exception of the two new body models, a station wagon and a sports utility, the Crosley for 1948 is basically the same as last year's car. Crosley has the jump on all other American small-car manufacturers by being already established in the business.

The new station wagon is an all-steel job of nice design but definitely on the small side. The sports utility has a cutout body with no doors and carries a removable canvas top. Mechanically, the new Crosley is the same as the old model, on which we reported in MI for July, 1947.

SUMMARY: What this all means is that there are still enough buyers for the 1947 products to warrant a continuation of the old turkey hash. As MI predicted more than two years ago, the car manufacturers will continue to dish up "leftovers" as long as the customers keep crowding in. When buyers begin getting scarce again, new models will be introduced overnight. This may happen before long because the postwar buying boon already is slowing down, and when the usual spring-season purchasing has passed, life may look a little grim for any new car with the old look. •

Supersonic Fish Finder

[*Continued from page* 81]

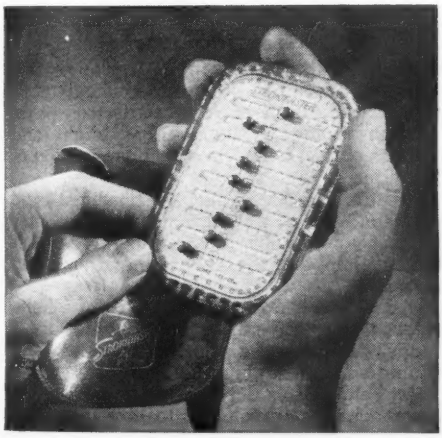
aluminum oxide coating on a special carbon type paper and a depth mark is recorded on the indicator paper as a fine purplish-black line.

The operation is continuous and the marks made by the individual soundings appear as a continuous line on the recording paper, showing the bottom profile and anything in between. Schools of fish, single fish and even individual clamshells are all recorded correctly and in detail in their relation to the ship's position. Schools of sardines appear as a cloud effect; schools of big fish show as an almost solid black pattern.

The first party-fishing boat on the North Atlantic coast to install the Bendix machine was the Viking I out of Freeport, Long Island, and its success has been watched with much interest by other boat owners. Skeptical at first of the wisdom of installing three thousand dollars' worth of equipment just to find fish, other captains are now making plans for the Depth Recorder's early adaption.

NEW PRODUCTS

King Midget, a small highway runabout is now being built on a mass production basis by Midget Motors Supply of Athens, Ohio. Closely resembling a midget track racer, the little car is furnished in knockdown kit form all ready to be assembled by the buyer. It features automatic fluid clutch, semi-self energizing brakes and special spring suspension. The car weighs about 300 pounds and uses a standard one horse motorscooter engine, mounted in the rear turtle deck. The price is slightly more than $100 for the complete kit to build the car, but less motor.



There'll be no more arguments about that birdie on the 9th hole with this new score keeper made of transparent Tenite plastic. Scores are totted up by moving knobs in the nine grooves on each side of the card. A running total on the game is kept by sliding the pointer around the edge. At the end of the game the knobs are returned to zero. Visioneer Products of Venice, Calif. is the maker.

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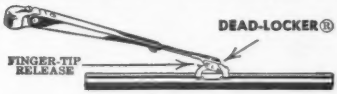

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Sure, he knows how dangerous it is for you to drive your car . . . in stormy weather . . . with dull old windshield wipers that *smear* and *SMEAR!*

He'll gladly put on for you—quickly—a pair of keen new ANCO RAIN-MASTER Blades—or Blades and Arms.

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He has RAIN-MASTERS . . . But he forgets to remind you? Too busy?

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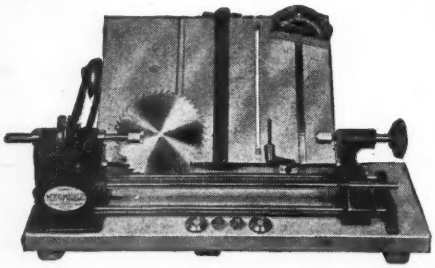

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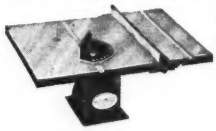

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Mechanics of Killing

[*Continued from page* 89]

Electricity enters the body through two electrodes, one on the head and the other on the right leg. To get perfect conductivity, these parts of the body are shaved, and a sponge soaked in brine is placed between the electrodes and the flesh.

After the electric chair had been in operation for some years, man continued to cast about for even more humane methods. The next major step in the technical progress of killing was the lethal gas chamber, now the legal method of execution in eight states: Arizona, California, Colorado, Missouri, New Mexico, North Carolina, Oregon and Wyoming.

The gas-chamber victim is bound hand and foot to a straight-backed chair in a sealed chamber, while the official witnesses observe through windows. A two-gallon jar of sulphuric acid and water stands at the side of the chair. At a signal, the executioner cuts a string outside of the chamber and releases about ten one-ounce "eggs" of cyanide of potassium. As the "eggs" plummet into the jar, clouds of death-dealing gas immediately arise.

The victim breathes once, twice.

Man thus has learned to temper justice with both humanity and science. For science, which has given man a far better life than he has ever enjoyed before, also has given a better death to the condemned criminal. •

Flying Farm Machine

[*Continued from page* 58]

culture officials. During the 1947 crop season, helicopters skimmed the ground, usually at 25 mph, for thousands of hours to destroy pests, fight unseasonal frosts, combat blight and even assist in the all-important pollination of plant life.

The purchase of a helicopter, however, is no simple matter. A Bell agricultural helicopter will cost you $25,000, plus extras for the dust or spray hoppers, the agitators and spraying equipment.

Even if you can dig up the price of a helicopter, flying one still isn't as simple as it sounds. Handling a helicopter takes long training and unusual skill.

Best bet, then, is not to buy this new flying farm machine yourself but to hire it and let "George," the professional pilot, do the flying. For helicopter service on your farm, contact the local airport, or write to Bell Aircraft Corporation, Helicopter Division, P.O. Box 1, Buffalo 5, New York; or Sikorsky Aircraft, Division of United Aircraft Corporation, South Avenue, Bridgeport 1, Conn.; or call up your nearest Federal or State agriculture official. •

Editor's Workbench Chips

[*Continued from page* 22]

"needed inventions" are the following:

Storage batteries having more satisfactory performance than present types at very low temperatures.

Accurate gages to show the draft and trim of vessels at sea.

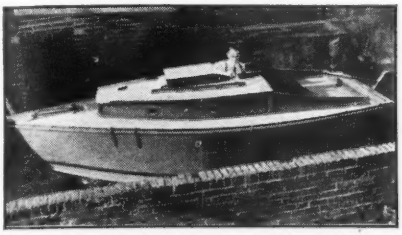
Simple roll indicator for vessels.

Effective naval fog indicator. (Radar shows other vessels or objects hidden in fog, but does not warn of the approach of fog itself.)

An electronic device for instantly, positively and effectively igniting oil burners. (If you've ever had your home oil burner fill up

[*Continued on page* 170]

BACK YARD BOAT



Mr. F. Wilkin, who lives in the Paddington section of London, England, didn't have a copy of Sam Rabl's book "Boat Building in Your Own Back Yard" when he started this 18-foot auxiliary, but he probably wishes he did! The design is the well-known "Bonnie" (MI plan No. 944) and cost the equivalent of only about $260 because scrap materials were used to a great extent. The boat filled all of Mr. Wilkin's backyard, but now it has plenty of space out on the River Thames.

MI'S FLYING FISHERMAN

Though this fine-looking outboard runabout is called "Picayune," the job Robert C. Vierling of Galveston, Texas, did in building her is far from it. He not only built a swell boat but he also constructed the husky trailer that carries her back and forth to the Gulf. Congratulations to you, Bob, for doing a swell job. A $10 Workbench Award is on its way south to you.

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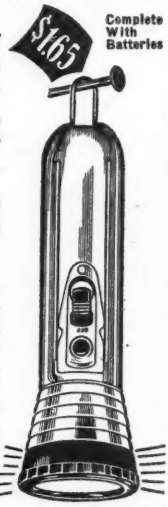
Result! * Each *new* No. 102 Bond Battery, measured by A. S. A. light industrial flashlight test, shows that it gives brighter light, longer hi-voltage life, *almost twice as much power* although they still cost only a dime.

It's easy to pick up a supply of these *new* Bond batteries from your dealer's self-service cabinet.

Remember, too, that Bond can be used in *any* item requiring regular flashlight-cell sized batteries.



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Buy at least two. They're bargains. Big chrome-plated *solid brass* barrels. In addition to its brilliant white light beam its new translucent lens ring emits warning red side rays. A 2-cell standard size flashlight with hook to hang the light handy for quick use. Your dealer has them for only $1.65 complete with batteries. Look the complete Bond flashlight line over. Priced from 59¢ up. Bond Electric Corp., New Haven, Conn., Division of Olin Industries, Inc.

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AMERICA'S FINEST FLASHLIGHTS AND BATTERIES

Editor's Workbench Chips

[*Continued from page* 169]

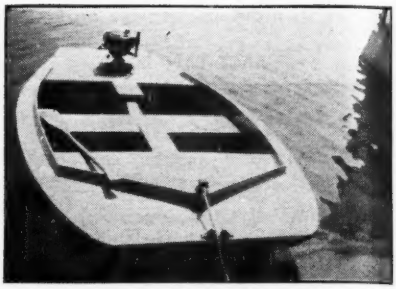
with fuel and then go "boom!", you can appreciate the importance of this one.)

Miniature radio transmitters for use in lifeboats, rafts, floats, etc.; something to replace the famed "Gibson Girl" crank-operated set of World War II.

If you have any bright ideas along any of these lines, the National Inventors Council, Washington 25, D. C., will be very glad to hear from you.

—*The Editor.*

SEAGOIN' BELLY WHOPPER



That's what you might call this unusual looking boat built by Stephen L. Cox of Oakland, Calif. The hull was made from a 310 gallon plywood belly tank, cut in two halves and strengthened by means of plywood bulkheads. The halves were then placed side by side and decking laid over them. The result is a comfortable, stable boat that carries six and is ideal for fishing. A 5 hp. kicker provides the power. We're sending a $5 Workbench Award to Mr. Cox for his ingenuity and resourcefulness.

FAMILY RUNABOUT

Here's the dry-land launching of a 13½ ft. outboard sea skiff which Wayne S. Paige of Amherst, Mass., built from MI Plans. The boat is lapstrake planked over oak frames and has a small forward deck. According to her owner, she's fast and stable and takes to rough water like a duck. A trailer with a chassis made from an old Ford front end is used to haul the boat. We hope you enjoy good fishing in her, Mr. Paige, and for your fine workmanship, we're sending you a $5 Workbench Award.

Your Invention Clinic

[*Continued from page 24*]

turn, furnishes current to a motor driving an auto. She states, "I realize this involves the principle of perpetual motion but would appreciate your opinion of the matter."

ANSWER: *In modified form the system of using the wind to operate a generator and then using the stored energy to operate a motor has been demonstrated on a boat. But it does not work exactly as you might imagine.*

Instead, the wind charger operates all night, or on several nights. The stored electricity then is used up in a much shorter time.

If it were possible to do what you propose, you not only would have perpetual motion but you would have to put brakes on the system to keep it under control. You see, the faster the auto runs the more rapidly would the propeller turn, the more current would the generator give and the greater would be the speed of the motor driving the auto. This cycle would build itself up to such a point that you might get infinite speed if the system were operable. We are just as sorry as you are that the method is unsatisfactory.

This same idea, in many modified forms, crops up again and again. Some students can give a satisfactory reason why your suggestion will not function. They then modify the thought slightly and hope that the modification will make a difference. But the answer always is the same: "It won't work."

Rocket Shell

Fred E. Bliss, Jr., of Tulsa, Oklahoma, submits a design of a spinning rocket which he thinks should give a higher impact pressure. He wants our comment.

ANSWER: *Your design is far from being developed enough to make a breakdown possible. It may be that a spinning rocket will give less impact than would a straight flying rocket because so much energy must be expended in maintaining the spin. However, this is conjectural. There may be other advantages to a spin and these might be compared by redesigning a bazooka and measuring its range, accuracy and striking or impact velocity with that of a regular, comparable shell.*

Mouse Trap

Dick Stangland of Warm Springs, Oregon, sends a design of a "better" mouse trap on which he wants our comment.

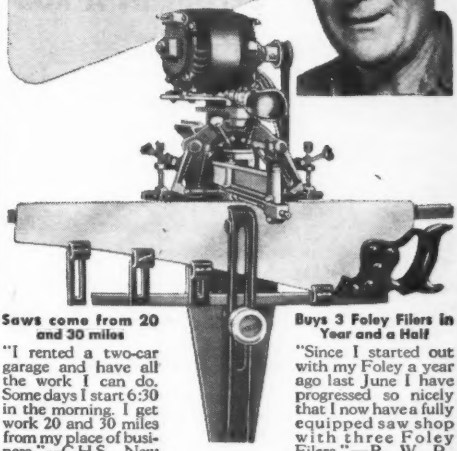
ANSWER: *So many mouse traps have been designed which do exactly what you expect of your trap that we would urge the greatest*

[*Continued on page 172*]

FREE PLAN

Tells How to Start Your Own Business

FILING SAWS



Saws come from 20 and 30 miles

"I rented a two-car garage and have all the work I can do. Some days I start 6:30 in the morning. I get work 20 and 30 miles from my place of business."—C.H.S., New York.

Buys 3 Foley Filers in Year and a Half

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FOLEY FILED SAWS BRING NEW CUSTOMERS

Here is a steady repeat CASH business you can start in your own basement or garage in your spare time. Every saw you sharpen with the machine accuracy of the Foley Saw Filer is an ad that brings you more customers. S.M.H., Penn. wrote to us: "I am doing very well with my Foley Filer, and I am glad I invested in your machinery. It is very satisfactory and works very well in the small community in which I live."

You can file all hand saws, also band and cross-cut circular saws on the Foley Saw Filer. The adjustments are simple—there is no eyestrain—and you can start right away to turn out perfect cutting saws. "The first saw I sharpened with my Foley Filer came out 100%. I think it is a marvel of perfection."—writes C.E.P.

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BETTER FISHING INC

SOUTH BEND
A Name Famous in Fishing

Your Invention Clinic

[*Continued from page* 171]

of caution in proceeding with this idea. Records should be searched very thoroughly, and mouse trap designs from all manufacturers should be compared. We have seen self-setting traps which cost no more to produce than would your design. In our opinion, your chance for a market with this article does not appear favorable.

Low Speed Gearless Electric Motor

Scott Industries of Cincinnati, Ohio, Arthur W. Stears of Prince Albert, Sask., and others have asked for further information about a low-speed gearless electric motor to which reference was made in a reply in this department.

ANSWER: *Patent number is 1,936,837, issued November 28, 1933, to Robert Helmar. The inventor lives at 47 Bakerhill Road, Great Neck, Long Island, N. Y. Lowest speed attained by special design, one revolution in eight minutes and 33 seconds, no gears or other transmission methods. Motor was used for many years for calibrating precision dials*

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photographically. Also used on an experimental electronic organ where great accuracy and constant speed are essential. Presently being used by a famous research laboratory on "secret" work which we prefer not to disclose. Motor can be wound for practically any desired slow speed.

Rotors

W. J. Smith of Steveston, B. C., Canada, writes: "In your opinion, what is wrong with rotors? Do the mechanics involved outweigh the advantages gained? Are we using them wrongly? There doesn't seem to be any 'dope' on rotors here."

ANSWER: *Nor will you find much information in any book in the average library. In more than 25 technical works on physics and mechanics, in a personal library, there was no single mention of the Magnus effect—only one relatively unimportant paragraph on the Flettner rotor. No better reason for continuing to read* MECHANIX ILLUSTRATED *need be given than this.*

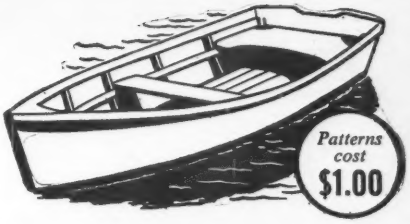
In our opinion, the utilization of the rotor principle has not even started to show its influence on designs or trends. The Anton Flettner rotor ship got but little attention when it first visited this country. The book, "College Physics," by Arthur L. Foley, Ph.D., says, "It appears that such a ship can move only when the wind is blowing. A sail boat does as much—with no expense for machinery."

But Flettner's purpose in demonstrating this ship, which he personally told me, was along the following lines:

Sailing vessels can carry cargo at a lower cost per mile than engine driven ships, but the cost of the extra manpower needed to take care of the vast expanse of sail has narrowed the difference between the two craft. True, engines could be used for furling and unfurling sails, but they cannot be used to take care of needed repairs or trouble aloft. So, if vessels could be made to operate satisfactorily by wind power, and but a small fraction of the motor ship fuel cost could be applied to the rotation of cylinders, and if such vessels could be made reasonably safe even in violent storms, sailing ships might again supply the answer to a successful merchant fleet. The rotor ship needs a crew no greater than is required for a regular diesel ship.

We concur with Flettner. On the other hand, the imagination has been so fired by this design and by some of Flettner's patents that the rotor principle is being suggested for use where it distinctly is not better than other less expensive methods which give greater safety than a rotating disc-ended drum. So, in our opinion, a distinct place could be found

[Continued from page 174]



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Your Invention Clinic

[*Continued from page* 173]

for rotors. Some of the suggested uses are not economically sound; some are unsafe. We haven't even started to use rotors, so the question as to whether they are used wrongly must be left for posterity to answer.

Automatic Parking Lot

Leon Adelman of San Antonio, Texas, sends a suggestion for a parking lot with a coin operated gate. He states that such a lot would need no attendant.

ANSWER: *You have outlined a suggestion for an automatic device, but we do not find the elements of invention. Your main task would seem to be to make practical the operation of such a system.*

Meter operated parking posts have been designed and are in use. If you could design a gate system which will allow only one car to pass through, regardless of size, you might have the elements of a patent. But, the trick is not easy if a good product is to be produced. Such a device must be rugged; it should not get out of order; it should operate during snow and sleet. It should be as damage-proof as possible so that accidental or purposeful running into the gate will not cause it to yield. The coin operated control must be reasonably burglarproof. Exits must be of the one way type and operable by small or large cars, trucks and trailers. But someone still must make collections and repair the mechanisms.

After you perfect such a device you need not apply it to parking lots, where the cost of installation and maintenance might overshadow its income potentiality. Such a gate could be used for toll highways and bridges. But don't overlook the value of a guard at the parking lot or the need of making change. Both are important. An automatic lot gives a crook plenty of time to do his job.

Adjustable Screwdriver

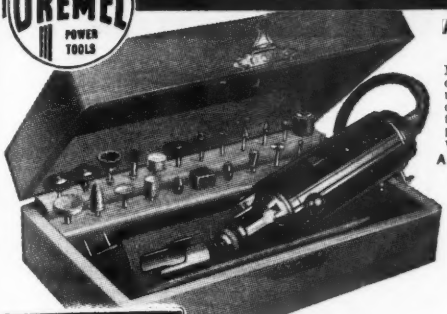
Alexander Zanni of Endicott, New York, sends an illustration from his pending patent on a screwdriver in which length can be adjusted. He wants to know if we think that it has sales possibilities.

ANSWER: *We feel sure that if you can produce this driver for sale at a price comparable to the modern screwdriver the purchaser would prefer this tool. But we do not see how you can do so with your present form of construction. Although you failed to send the specifications, your drawing would seem to show that you are using a jawed chuck to grip the shank which is milled on one side.*

[*Continued on page* 177]

ELECTRIC DREMEL POWER TOOLS

MOTO-TOOL THE "POCKET-SIZE" MACHINE SHOP



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With 23 Accessories (HIGH SPEED STEEL Cutters, Grinding Wheels, Polishing Accessories)

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Only $9.95
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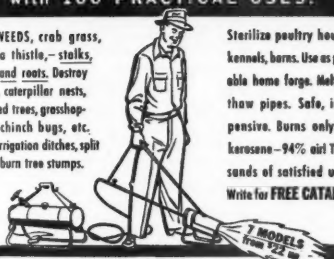

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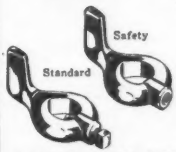

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1¼	1.20	1	1.00
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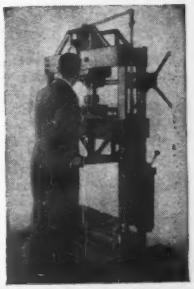

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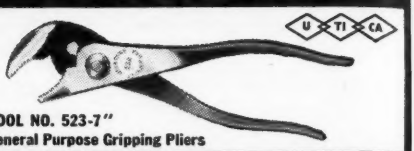

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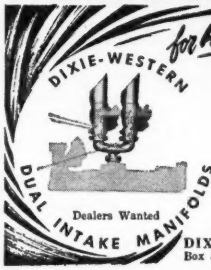

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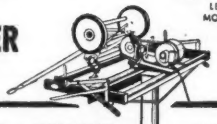
PRICE $241.50 LESS MOTOR



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JET SHOOTER 35c

Send 15¢ for Catalog

If your Dealer cannot supply you send 10% postage and order direct.

The Megow Corporation Philadelphia 22, Pa.

Your Invention Clinic

[*Continued from page* 174]

A square shank in a similar hole would make for greater strength; a set screw or plunger dropping into holes drilled through the shank would be a less costly construction and offer greater resistance to pressure. Perhaps this or similar modifications can be made within the scope of your allowable claims.

Radio Commercials Eliminator

Walter R. Shrader of Johnstown, Pa., states that he has made a device which "will eliminate any and all radio commercials from any receiver without other interference in any other way." He wants to know if there is any law to prevent its use.

ANSWER: *We know of no such law, but feel sure that the sponsors won't like this invention if what you say is true. So far as the listeners are concerned you will have invented the dream of the present age. It sounds just too good. Frankly, we cannot perceive of any electrical or mechanical device which could perform in this almost super-human fashion. Failure to enclose description of its supposed operation makes it impossible to locate probable errors in reasoning.*

We would suggest that you continue to experiment until you perfect the idea or until you realize that it can't be done.

[*Continued on page* 179]

"I'm trying to catch up on my correspondence."

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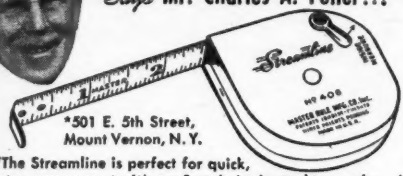
Says Mr. Charles A. Fuller...*



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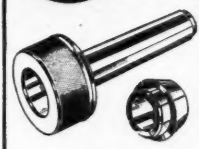
NEW ADJUSTABLE COLLET BUSHING CHUCK—

provides an accurate method for mounting centerless armature shafts and similar parts in a lathe. Use in either head or tail spindle. The brass collets are adjustable for running or driving fits. Chucks supplied with 3 collets; 9/16", 5/8", and .637" capacity. Extra round collets, 1/4" to 1" by 16ths, $1.00 each.



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12 Chapters, 77 Illustrations dirt track, championship and midget cars. How to build engines, chassis and bodies. Why the fast ones are fast and how to make them fast. How to speed up Ford V-8 cars and rebuild Ford A and B engines. How world's record cars are built. Official AAA midget rules and international formula. Order NOW! $1.00 Postpaid; $1.19 C. O. D. Money back if not satisfied.

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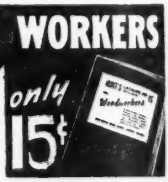

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SAVE MONEY SAVE TIME
Now anyone can save time and effort mowing field or lawn by building their own whirl type power mower. Build according to your own ideas and needs at small cost. Cut close to fences, walks, buildings, etc. Build in short time with parts and instructions we furnish. Save hours of time and back breaking labor. Write today for FREE information.

IT'S FUN TO BUILD

T & H MFG. CO., Dept. MI114
811 E. 31, Kan. City 3, Mo.

Your Invention Clinic

[*Continued from page 177*]

But before we would be satisfied we would have to see a description of the article or hear it in operation. It is beyond our imagination to picture a device which would not cut off a news report yet cut out a commercial by the same announcer; or how the device could distinguish between some of the poor music one hears yet eliminate the better quality of a singing commercial. But do not suggest a time clock control as the answer. This would require a daily setting and might be made useless by a change of a fraction of a minute in routine. Furthermore, it presumes that the listener has a beforehand knowledge of the time when the commercial is to be aired.

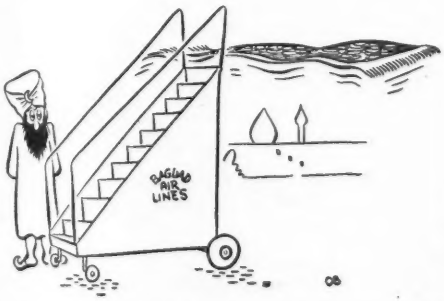
We feel sure that millions of radio listeners will cry for this product as soon as it is made available. We sigh for it right now. And fear of its popularity might reform some broadcasters who then will limit commercials to within the allowable tolerance of the listener.

Solid Carbon Dioxide Cone Caps

E. J. Unger of Annville, Pa., sends us a disclosure outlining the use of caps made from carbon dioxide snow and intended to fit the top of an ice cream cone. A famous ice cream manufacturer offered to give these a trial, but a manufacturer of solid carbon dioxide was not partial to the suggestion. He wants to know what we think of the idea and where to go from here on.

ANSWER: *We feel sure that if you had attempted to make the caps and had tried to keep them for the specified use you would have found that the product is not quite as good as you imagine it to be. The fact that the caps constantly decrease in size as the solid gasifies, together with the fact that there would be a tendency of the caps to freeze together, makes the article not favorable to commercial production by ordinary methods. Modifications could be arranged to make the scheme more suitable.*

[*Continued on page 180*]



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Used by army in noisy applications in aircraft, tanks, etc. Many interesting home uses.
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New B29 navigation instrument which can easily be used to make a good contact printer, strip map holder, etc. The plywood case 14½"x11"x10" high is perfect as a tool kit, camera, projector case or for building a portable phonograph, picnic kit, make up case, etc., has leather handle reinforced covers, 8 covered compartments in bottom. Cost Gov't $125.00. Add postage for 20 lbs.

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7½° S. to 37° S. 23½° N. to 8° S. Your Choice
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Makes excellent home lighting plant, operated by wind propeller, waterfall, gas engine, or hand crank. Reduction gear allows full output at slow speed; supplies 6 volts at 2.45 amp., 425 volts at .115 amp. New. Add postage for 28 lbs. **$7.95**

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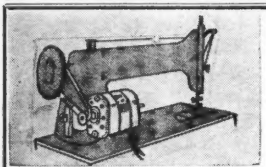

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NEW PRICE
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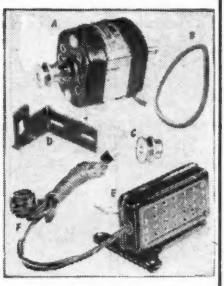
Adjustable For Use With Any Type Of Sewing Machine

Anybody Can Install It!
Takes but a few seconds



COMPLETE SET CONSISTS OF:
(A) MOTOR & BRACKET—Universal AC or DC. 60 cycle. 115 Volts. (B) BELT—Long Wearing Rubber Belt. (C) PULLEY—Single Grooved Steel Hubbed Pulley. (D) BRACKET—New and Improved. (E) FOOT CONTROL—7 Step Rheostat. (F) CORD SET—Extension Cord fitted with plug and socket. (G) Installation Instruction Sheet.

SPECIAL NOTE: This 1/20 H.P. motor with double end shaft and rheostat can be used in all hobby workshops for flexible shaft attachments, grinding, drilling, etc.

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Please rush _____ motor kits at $17.25 each
☐ money order or ☐ check
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Name _____

Address _____

City _____ Zone____ State_____

Your Invention Clinic

[*Continued from page* 179]

But there is always the element of danger to the user. The youngster who knows little about handling dry ice is likely to get into all kinds of mischief. So while you might be impressed primarily with the benefits, the manufacturer and store owner must avoid anything which is likely to cause suits for personal damage. Furthermore, there is the added element of costs. Someone must pay for the caps and the capping operation. The store owner doesn't much care what happens to the cone after he sells it. Why should he stock caps and distribute them? In most cases the caps will not increase his business. If volume business in cones is desired a more solidly frozen cream could be sold in heat proof bags which may or may not be further fortified with a small cube of dry ice. These would be cheaper for bulk handling.

Frankly, we see nothing of value here and would suggest that you forget the whole thing.

Active Metals Power Motor

William E. Rosst of Brooklyn, New York, states that he has knocked out most of the bugs in a small motor to power model boats and cars; it uses the "active metals" as fuel. He claims that the fuel is inexpensive and could be supplied in pill form.

ANSWER: *Just what do you mean by "active metals"? Are you referring to metallic sodium or potassium? Or do you mean zinc and an acid or aluminum and an alkali?*

If your motor calls for the use of metallic sodium or potassium you might as well forget it. The materials are expensive; they cannot be shipped by ordinary means; they cannot be handled in pill form in any satisfactory fashion; and definitely they are dangerous. But if you have developed some other economical system which is safe to handle, we certainly

[*Continued on page* 182]

"Mower to tower—mower to tower—am I clear to cross runway three?"

ASSEMBLE *King Midget*

Practical, safe, low cost Highway Runabout, with all the snap and looks of the finest midget track racers. Home assembly keeps cost low. Just bolt together from our factory built parts. Immediate delivery. See how easy it is: 24-page assembly book, drawings, photos, blueprints, Plus detailed illustrated circular $1, (refunded first order). Circular only—25c.

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DO YOUR OWN WELDING
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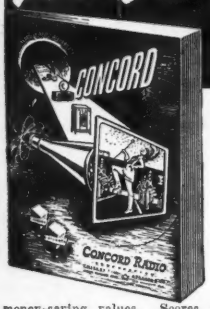

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Full size plans, drawn from actual factory plans. Models are built same as large boats with frame construction and strip planking. Kit contains all printed parts and planking, sanding sealer, blade, brush, copper shaft and trim wire, metal display propellers, cement, flag, sandpaper, plastic sheet, 5 page instruction booklet, etc. Not included are finish paints or material for inside furnishings, although detailed plans of inside are on the master plan. Speeds to 50 M.P.H. with ¾ H.P. engines. Send 10c for literature on models, gas engines, drive units and fittings. We have only the finest!

DUMAS PRODUCTS

2222B N. Farwell Avenue — Milwaukee 2, Wisconsin

World's largest manufacturer of power boat models.

Your Invention Clinic

[Continued from page 180]

would suggest that you investigate the possibilities of manufacturing the pills, look into the regulations concerning shipping, and that you work further on the motor with the hope of perfecting it.

Can Opener

George Derosier of Putnam, Conn., wants to know what we think of a can opener which "is extremely simple; opens a can with but one turn; never fails; fits any size can; can be mass produced cheaply and will last indefinitely." He also wants to know what he might expect in royalties over a ten-year period.

ANSWER: *Any number of can openers satisfy the first five properties which you list and also roll over the sharp edges. By what findings did you arrive at the conclusion that your opener would "last indefinitely"? That is a little difficult to swallow. Nothing lasts that long, you know.*

Suggest that you have a search made to determine if you might have a patentable item. Then recommend that you make a model and test it thoroughly.

Royalties would depend largely on who manufactures and tries to sell the item. Also on its price against what the buying public thinks it is worth. With a good business arrangement and at a penny royalty per opener you could anticipate $140,000.00 over the ten-year period.

[Continued on page 184]

"What if I did catch you sweeping a little dirt under the rug? We want you to stay."

TOOL STEEL DRILL ROD

$1.95 POSTPAID in Continental U.S.
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STEELS and ALUMINUMS with a motorboat tone

SINGLES, Chev, V-8, Plymouth, Steels $5.50, Aluminum $6.50, Chry., Olds., Buicks, etc., Steels $7.50, Aluminum $8.50. V-8 and MERCURY DUALS, Steel $17.50, Aluminum $20.00. Aluminums are guaranteed for life of your car.

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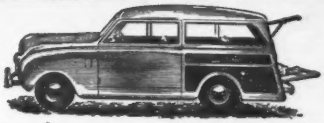
Kelsey, Inc., D-9, Meriden, Connecticut

NEW CROSLEY STATION WAGON



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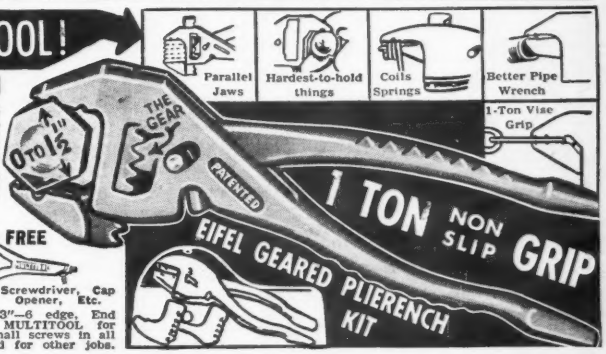
Here's a tool as versatile as your own fingers. The Patented PLIERENCH applies 1 ton of NON-SLIP direct pressure! Adjusts quickly to a million sizes—0" to 1¾"—with jaws always parallel—no lost motion. Holds everything rigidly. Does all the jobs you only hoped to do with other tools. Acts as pliers, wrench, vise, wirecutter, clamp, etc. Handy kit holds extra jaws for other jobs. PLIERENCH is used by thousands of mechanics—praised by all. Solid Guarantee. Finest tool you'll ever own. Available in 7" or 8½" Kit. Send today for FREE manual and catalog on the amazing PLIERENCH and get FREE MULTITOOL. AGENTS—DISTRIBUTORS — Wonderful opportunity. Write today.



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Screwdriver, Cap Opener, Etc.

FREE—this 3"—6 edge, End and Angle MULTITOOL for large and small screws in all positions and for other jobs.

AMERICAN PLIERENCH CORPORATION
4611 N. Ravenswood Avenue
Chicago 40, Ill., Dept. MI-84

Your Invention Clinic

[*Continued from page* 182]

Radio Speaker

Ira J. Austin of Golconda, Ill., sends diagrams for a new type of radio speaker and would like our opinion of its value.

ANSWER: *It may not make any difference to you if you push your foot into a shoe or if you pull your shoe on your foot, because the end result is the same, but in the case of a speaker there is considerable difference where the coil is put. The only thing you have done is to swap positions of coil and permanent magnet (or electromagnet). But, by doing this you have interfered greatly with the operation of the speaker. A heavy magnet cannot be set into motion quickly. When in motion it cannot be stopped quickly or reversed. The inertia is too great in your design to offer anything in the way of an improvement. The lighter the coil the better is the response of the speaker—all other things being the same. Your design cannot be made to work as well as even a poor modern speaker, so forget it.*

Toy Power Shovel

R. Le Compte of Pinckneyville, Ill., claims to have built a toy power shovel operated by remote control. He says that it handles just like a real shovel.

ANSWER: *We would suggest that you have a search made right away. As nearly as we know, no such toy has appeared on the market. And if it operates through levers just as does a real shovel, while control of the levers affects the action of the miniature, then there should be a good market for the product on condition that it could be made to sell at a satisfactory price.*

Although we dislike the nature of your power supply, there may be a reason for its use. If the decision was merely because you had a motor which operated by current from the established voltage, we would suggest that you try a more popular form of motor. If your reason was because of flexibility of control, let it stand.

"Magic Mirror" Windshield

Frank E. Martinets of Granger, Texas, suggests the use of a "magic mirror" for the windshield of an automobile, "to prevent glare because most of the light would be reflected away."

ANSWER: *The half silvered mirror depends for its success on the fact that the far side is completely dark and the near side is well lighted. It cuts down half of the light passing through, also halves your ability to see. To use it successfully on an automobile you must black out all the windows except the front.* •

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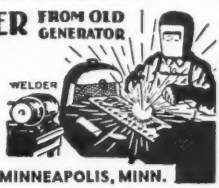
Produces 75-200 amperes. Takes no previous experience or hard work to make one of these welders. Complete plans 35c. Send for your **PLANS** today and we'll include **FREE** our Big NEW Catalog listing hundreds of electrical bargains.



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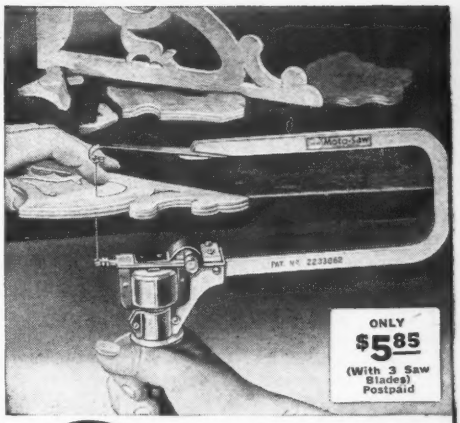

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THE AMAZING ELECTRIC SCROLL SAW

Boys from 8 to 80 (and girls, too) have fun with a Moto-Saw . . . it works more like magic than any tool you ever saw! It takes no effort to run, no perceptible pressure to feed. Runs 7,200 strokes a minute . . . easily cuts intricate scroll designs in medium hard wood up to ¾" thick. Blade holder faces blade 4 ways . . . permits you to saw sideways as well as forward and backward. No limit to length of stock it will cut . . . saws to center of 19" widths. **Moto-Saw is as safe as a hand saw** . . . has only two moving parts . . . never needs oiling. Uses 110-120 V. 50 or 60 cycle A.C. (only). Thousands of satisfied users.

MONEY-BACK GUARANTEE: If your dealer does not yet have Moto-Saw, send only $5.85 . . . we'll pay postage. Or send $1, and pay postman balance plus postage. Money back if not delighted after 5 days' trial.

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WITH *GIL-BILT*

PLANS-PARTS PRECISION ARBOR

- 21x27 in. hardwood table reinforced with aluminum channel, tilts full 45 degrees; 13 in. capacity in front of blade.
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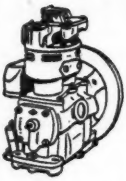
138 West 13th Street, Indianapolis 2, Indiana

AIR COMPRESSORS

Model 2-V-S-4-V-A Bendix-Westinghouse 4 cu. ft.



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Original Cost Over $140.00

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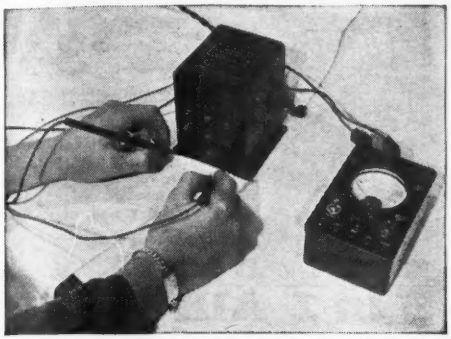
1520 Locust St., Kansas City, Mo.

Danger—High Joltage



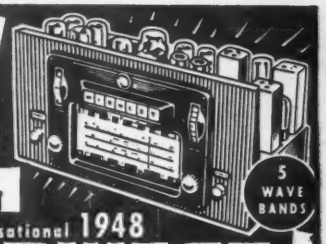
A voltmeter connected to a radio power transformer proves that the latter gives almost 600 volts. Be careful!

One of the things I notice about the present generation of students attending radio and electrical classes is their tendency to overlook the serious effects that high voltage can have on the human body. These boys were born into the electrical age and they are inclined to take electricity for granted. It is only when they get a little careless about handling radio equipment, and get kicked across a room from the resulting shock, that they realize that high voltages mean danger. A couple of my students who learned the hard way have changed the usual "Danger—High Voltage" signs to read "Danger—High Joltage."

I don't mean to frighten anyone, but is a good idea to remember that even the ordinary "110 volt" house current, which in many places runs closer to 118 and even 120 volts, has been the cause of many fatal accidents. A very simple rule, the observance of which will assure electricians and radio men a long and healthy life, is never to touch an exposed metal connection with the bare fingers. In the case of radio experimenters, hams, and service men, it is even more important to remember that the voltage in some parts of a circuit is considerably more than 110 volts. The innocent looking little power transformer used even in many small radio sets develops about 500 or 600 volts. I had trouble convincing one group of students of this, and proved it simply by connecting a voltmeter to the outside leads of the high-voltage secondary. What fools everybody is that these transformers are usually described as delivering 300 volts "on each side of the center tap." This is true, but the voltage across the *outer* ends of the winding is double that figure. Conventional full-wave rectifier circuits are arranged so that they give about 225 or 250 volts DC at the *end* of the filter circuit, which consists of a choke

[*Continued on page* 191]

NEW SERIES 16 IMPROVED NO-DRIFT FM in the Sensational 1948 MIDWEST RADIOS



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A truly magnificent instrument that offers new, improved No-Drift FM, 5 Wave Bands, Automatic Intermix Record Changer that handles both 10" and 12" records, 14½" Panasonic Speaker, and exclusive Midwest Tri-Magnadyne Coil System and Color-Ray Tone Selection. Luxurious Cabinets. Other Console and Table Models with Series 16, 12, and 8 Chassis.

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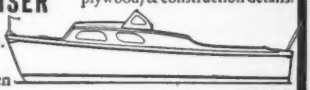

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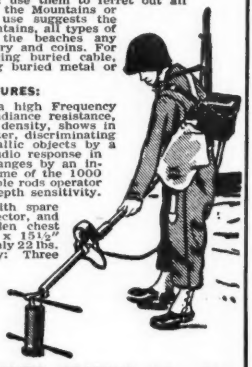
AN/PRS-1 is a portable device for detecting Metallic and Non-metallic objects. You can use them to ferret out all kinds of Buried-Treasures, in the Mountains or on the Beaches. Its private use suggests the following: In the hills or mountains, all types of Metals and Non-metals; on the beaches any type of objects such as jewelry and coins. For commercial use such as tracing buried cable, wire and sewer tile. Locating buried metal or wooden boundary stakes, etc.

TECHNICAL FEATURES:

This unit actually is a Ultra high Frequency transmitter. A variation in radiance resistance, caused by any change in soil density, shows in a deflection of the Microammeter, discriminating between Metallic or Non-metallic objects by a swing to the right or left. Audio response in the Headset also indicates changes by an increase or decrease in the volume of the 1000 cycle tone. By lengthening dipole rods operator will be able to increase the depth sensitivity.

This unit comes complete with spare tubes, antenna dipole and reflector, and instructions manual, in wooden chest 9½" height x 28¼" length x 15½" depth. Weight in operation is only 22 lbs. LESS Batteries. Power supply: Three 45 volt and one 6 volt batteries. Uses standard batteries. Original COST $285.00. Shipping Weight appr. 80 lbs. F. O. B., N. Y.



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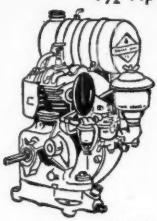

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Engines will develop almost 2 Hp at 3600 RPM. Hurry don't wait, buy now while limited supply lasts. Suitable for lawn mowers, garden tractors, motor bicycles and scooters, midget cars, etc. Will power many kinds of machinery.

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SPORTSMAN JR.—Sensational, low-priced air pistol. Ruggedly built, full size target gun shoots either standard BBs, pellets or steel darts. Fast, single-action compression chamber. Single shot, silent shooting. Use indoors or outdoors. Modeled after famous target pistol. Economical to operate. Die cast all metal non-slip moulded grip; machined steel chamber and barrel. 8-in. long; 4½-in. deep; full size, weighs 15 oz. EACH **$3.49**

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Shoots BBs Darts Pellets

Add Sales Tax.

BBs, 3 pkgs. 25c; .177 pellets, 500 for $1.50; steel darts, 35c package. (Order plenty). Holster, 50c.

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BUILD YOUR OWN Battery Driven ELECTRIC LAWN MOWER..

This ultra-modern rotary blade mower can be made from inexpensive parts and an old auto generator. Mower runs forward or backward, close to walk and shrubs; cuts tall or short grass, weeds, etc. Easy to adjust, cutting height. Plans complete, easily followed. Send 35c today.

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SENSATIONAL NEW PORTABLE JIG SAW READY!

LOW COST

SYNCRO presents an amazing electric "plug in" jig saw—plug in to any 50 or 60 cycle AC 110-120 volt outlet—work in kitchen, anywhere—in apartments, houses! Cuts intricate designs on thin wood, metal, plastic. World's SAFEST Saw! Every family needs one—for fun and profit. Rush post-card for FREE colored Circular now!

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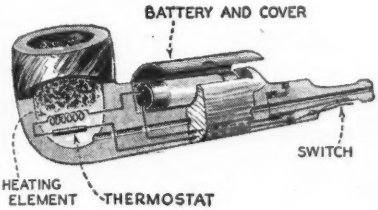
SPORT-O-SPEED, DEPT. C, 520 LOTUS ROAD, RIDGEWOOD, N. J.

Pipe Dream

There is a universal and perhaps justifiably founded notion among pipe smokers that pipes and pipe tobaccos are nothing more than a promotion scheme on the part of match manufacturers. The inveterate stem chewer knows that he must keep a large quantity of matches on hand if he expects to enjoy the aroma of his favorite brand of weed.

What I want to know is this: Why can't something be done? In this era of scientific accomplishments, surely the genius that produced radar and the atomic bomb can be diverted for just a short time to work on the equally important problem of maintaining combustion in the bowl of one's favorite briar. After all, what's so complicated about the problem? I would like to present it as a challenge to the ingenuity of the readers of MECHANIX ILLUSTRATED, along with a suggestion on which they might start.

Thermostats which are sensitive to temperature changes are very common. So is



the use of thin resistance wire for producing heat when an electric current is passed through it. And batteries are getting smaller and smaller. My first thought would be to combine these well-known electrical devices somewhat in accordance with the accompanying sketch. The Nick O'Teane automatic pipe lighter, as can be seen from a study of the drawing, consists merely of a tiny thermostat in series of a small coil of resistance wire, the combination in series with a tiny cylindrical battery and a "grip switch." The operation of the device is (or should be) simplicity itself. Pack the bowl with tobacco. As a concession to pre-atomic age habits, light up the old fashioned way by means of a match. Throw the match away. From now on you will inhale clean, lovely tobacco smoke and not gooey juice or unburned bits of tobacco leaf. Why? Well, it's too ridiculously easy. Whenever the pipe stem is gripped between the teeth, the tiny contacts built into the stem are closed and the electrical circuit comprising the battery, the thermostat, and the resistor is closed. However, the contacts in the thermostat, depending on the temperature of the surrounding tobacco, are either open

[*Continued on page* 191]

AIR COMPRESSOR

Piston type, size 2x1¾, head in valves, bronze bearings splash lubrication. "V" Belt drive. Intake muffler and cleaner. Capacity 2.8 c.f.m. at 100 lbs. continuous pressure, or 150 lbs. Intermittent pressure with ½ HP motor. Can be used with ¼ HP at lower speed. Weight 24 lbs.

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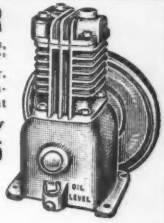
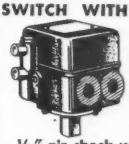


AUTOMATIC PRESSURE SWITCH WITH UNLOADER



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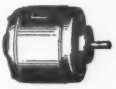

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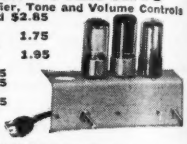

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Danger—High Joltage

[*Continued from page* 187]

coil (sometimes the field coil of the loud speaker is used for this purpose), and one or two electrolytic condensers, but the transformer itself starts off with the higher voltage. Some voltage is lost in the rectifier circuit. If you go poking around the wiring with the power on you certainly will discover that this high voltage is no joke.

Standard radio power transformers usually contain several windings. In addition to the high-voltage winding mentioned, there are low-voltage windings giving about 5 and 6.3 volts for lighting the tubes. These voltages are entirely too low to cause any sensation at all to the fingers. However, the wires coming out of the transformers usually are bunched, and it isn't easy to tell them apart. Play safe and check them by means of a voltmeter and a pair of insulated test prods, as shown in the picture.

The transformers used for short-wave transmitters give much higher voltages. A "small" one, for a low-powered outfit, develops 1200 volts at one winding. For medium powered rigs, 2500 and 3000 volts is not unusual. In some television receivers the voltage for the cathode ray tube (the end of which is the picture screen) is likely to be in the neighborhood of 12,000 volts. That's a lot of volts any place! Actually, this is no more dangerous than 110 or 1000 volts IF IT IS GIVEN THE PROPER ATTENTION. That attention consists merely of not touching exposed connections with anything other than insulated prods.—*A School Teacher.*

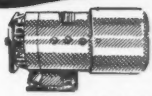
Pipe Dream

[*Continued from page* 189]

or closed. If the tobacco is burning properly, the thermostat contacts are kept open, no current flows through the resistor, and no strain is placed on the battery. However, let us suppose that the smoker forgets to draw in his breath for a minute or two. The smoldering tobacco cools off, the thermostat contacts click shut, current from the battery passes through the resistor wire, the latter becomes reddish hot, and presto—the tobacco is made to burn! All this happens without the smoker even being aware of it. All he knows is that when he remembers to puff again, smoke will come through the stem.

Don't dismiss this idea as a pipe dream. Technically, it is absolutely sound. The same principle has been used for years in electrical heating pads, blankets, fish tank heaters, photographic processing baths, etc. Come on boys, get busy and let's see what you can do! —*Nick O'Teane.*

WAR SURPLUS AND OTHER BARGAINS



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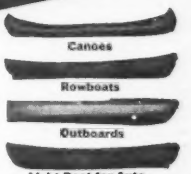

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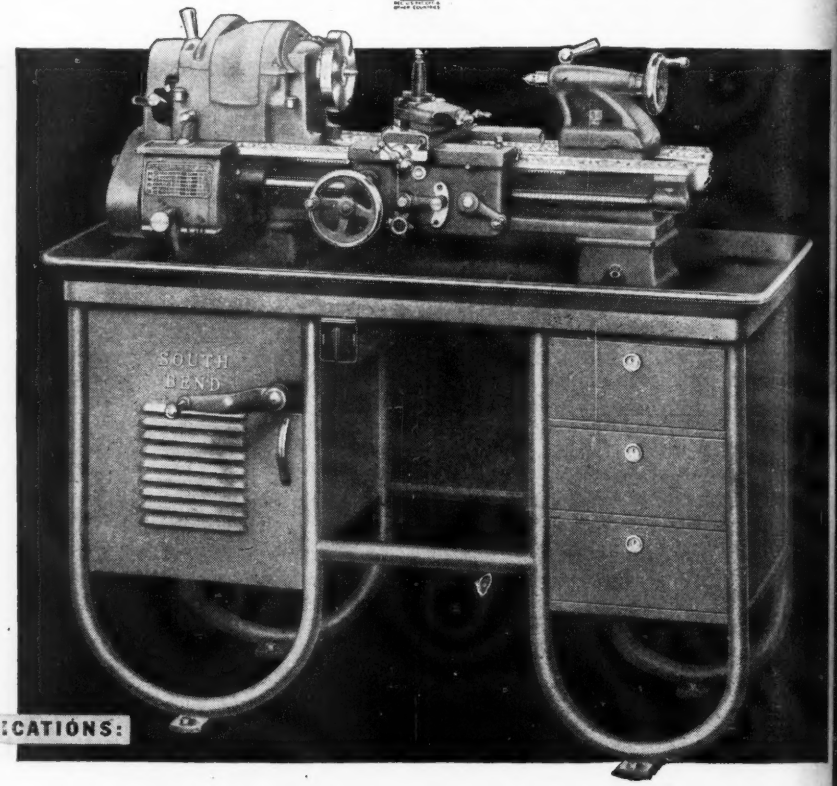

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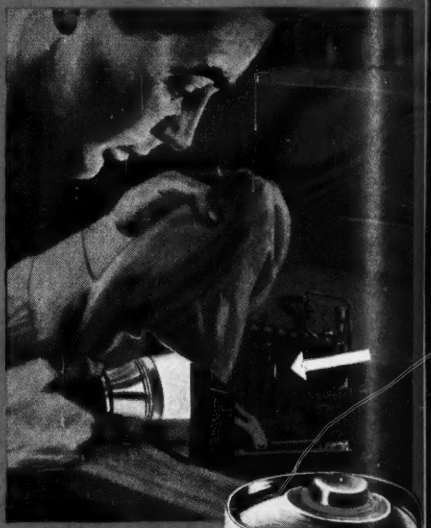

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